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Stocker, John Sherwood, M.D., 2, Montague Square, W.
Stormont, Henry J., Cheshunt, Herts
Stothard, W. J., Denmark Hill, S.E.
Stuart, Henry Wm., Guy's Hospital
Sutton, Frederick, Borough Lunatic Asylum, St. Augustine's Gate, Norwich

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Taylor, Frederick, M.D., Guy's Hospital
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Turner, Henry G., Montague House, Boscombe, Bournemouth
Turner, J. Sidney, Woodside, Anerley Road, Upper Norwood

Underhill, W. Lees, Tipton Green, Staffordshire

Valentine, Edmund William, Somerton, Somersetshire
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Veasey, Henry, Woburn, Beds
Venour, William, Army (per Mrs. Venour, Teddington, Middlesex)
Vesey, T. A., M.B., West View, Rosstrevor, Ireland

Wacher, Frank, Kent and Canterbury Hospital, Canterbury
Wales, T. Garneys, Downham Market, Norfolk
Walker, Benjamin, High House, West Bromwich
Wallace, Richard U., M.B., Amherst Road, Hackney
Waller, W., Guy's Hospital
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The Transactions of the Obstetrical Society of London.
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ON

ACUTE DILATATION OF THE STOMACH.

By C. HILTON FAGGE, M.D.

Dilatation of the stomach, independent of obstruction at the pylorus or in the small intestine, is a condition which has long been recognised. A good example of it was recorded by Andral in his 'Clinique Médicale.'[1] The patient was a woman, æt. 23, who died after thirteen months' illness, of which the principal symptom had been vomiting. The stomach was found, after death, to be very much dilated, descending to the pubes; its parietes were thin; the muscular layer very much attenuated. The records of post-mortem examinations at Guy's Hospital within the last fourteen years contain at least two similar cases, one of which was observed on August 13th, 1857, by Dr. Wilks; the other on February 19th, 1866, by Dr. Moxon. Unfortunately, clinical details as to these cases are almost completely wanting. The subject of dilatation of the stomach, apart from pyloric obstruction, is also discussed at length by Prof. Bamberger, in the 6th volume of 'Virchow's Handbuch der speciellen Pathologie und Therapie;' and a chapter is devoted to it by Dr. Wilson Fox, in the second volume of the yet unfinished 'System of Medicine' of Dr. Russell Reynolds.

Very much more frequent, however, than this affection is that in which dilatation of the stomach occurs secondarily to obstruction at the outlet of the organ, whether arising from the development of a morbid new growth in the pylorus or the contraction

[1] English translation by Dr. Spillan, 1836, p. 852.

consequent on the healing of an ulcer there or in the duodenum. That the stomach becomes enormously enlarged under such conditions is mentioned by every writer on its diseases; and, recently, the subject has attracted considerable attention in consequence of the great relief which patients suffering from this form of dilatation have experienced from the systematic use of the stomach-pump, and from washing out the cavity with Vichy water, as suggested by Dr. Adolf Kussmaul.[1]

Even now, however, I think that the physical diagnosis of dilatation of the stomach has hardly been studied with the care that it deserves. It would be a great mistake to suppose that an enlarged stomach differs from the healthy organ simply in occupying a larger part of the abdomen. On the contrary, I believe that a constant feature of these cases is that the organ is greatly displaced downwards; the gastro-hepatic omentum, the lesser curvature, and the cardiac extremity of the stomach, being all much elongated. Hence, instead of the dilated stomach forming a prominence in the epigastrium, that region is more or less deeply hollowed, whilst below the umbilicus one may observe a large rounded tympanitic swelling. Manipulation of this swelling generally gives rise to a very distinct splashing of fluid and air, and which is, perhaps, more marked than when the intestines contain similar matters. And in many cases fluctuation may be detected, which might be mistaken for that caused by an ascites.

But the most distinctive feature of dilatation of the stomach in these cases, and that which enables the exact position of the organ to be most accurately determined, is afforded by the peristaltic movements of its muscular coat. It is remarkable that scarcely any writer on diseases of the stomach alludes to this very valuable diagnostic sign, which, however, has for years past been well known to the students of Guy's Hospital, having been frequently pointed out to them by Sir W. Gull when cases of this kind were admitted into his wards.

As Sir W. Gull remarked to me some time since, medical men often think that by placing the hand under the patient's bed-clothes they can sufficiently well examine his abdomen. It ought to be freely exposed, and the light allowed to fall

[1] "Behandlung der Magenerweiterung durch eine neue Methode mittelst der Magenpumpe," 'Deut. Archiv f. Klin. Med.,' vi, p. 455.

obliquely on its surface. A dilated stomach will generally betray its position by visible peristaltic movements, which usually begin near the left costal cartilages, descend below the umbilicus, and after passing over to the right terminate by ascending more or less towards the right hypochondrium. In a case lately under my care a rounded protuberance displayed itself, as large as a fœtal head, and appeared to revolve slowly as it followed the course I have indicated. Sometimes, also, faint waves may be seen passing in the opposite direction across the surface of the stomach, due, therefore, to an antiperistalsis. Often, when no contractions are at first visible, they may be induced by manipulating the abdomen rather roughly or by flicking the surface with a cold wet towel. When the contractions are considerable, they may be attended with a rumbling noise, audible at some distance from the patient, and with more or less griping pain. The course taken by their movements, and their position, are probably sufficient to distinguish them from the peristaltic contractions of any other part of the alimentary canal. The movements of the small intestines, so frequently seen in cases of chronic intestinal obstruction, present very different characters; and in the transverse colon direct peristalsis would produce a wave passing from right to left, or in the reverse direction to that which has been described as belonging ordinarily to the gastric contractions. In one instance, indeed, in which all the symptoms pointed to the existence of chronic obstruction of the large intestine, with dilatation of the transverse colon, I observed movement from left to right, which must, therefore, have been due to an antiperistalsis; but the seat of distension was then very different from that met with in cases of dilated stomach, and the sacculi of the bowel appeared to be plainly visible.[1]

I have entered into the more detail with regard to the physical diagnosis of what may be termed chronic dilatation of

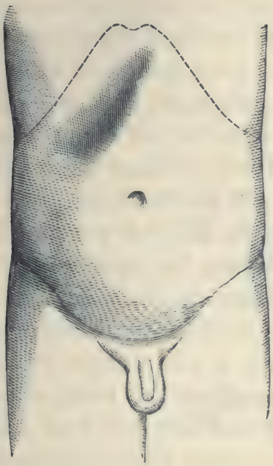
[1] Dr. Brinton, as is well known, denied the occurrence of antiperistaltic contractions of the intestine. But Engelmann has recently observed such contractions in dogs, rabbits, and cats ('Pflüger's Archiv,' 1871, iv, p. 33). Even were Dr. Brinton's views correct, they would not, I presume, be applicable to the stomach, in which organ reverse movements of the contents are believed to occur regularly during digestion.

the stomach, because in some respects I believe them to differ from those belonging to another condition which I am now desirous of describing, and which I may distinguish by the title of acute dilatation. This latter affection is probably very much more rare than the chronic form of the disease, and it has as yet almost escaped the notice of medical writers. Its peculiar symptoms and course will, perhaps, be brought out better by the recital of a case which recently came under my observation than in any other way.

CASE 1.—*Acute dilatation of the stomach, with paralysis of its muscular coat, supervening upon a retro-peritoneal abscess communicating with the duodenum; use of the stomach-pump; evacuation of seven pints of fluid; return of the stomach to its natural dimensions and seat; death from exhaustion.*

On the 29th of August, 1872, I was asked by Mr. Hooper, of the Blue Anchor Road, to meet him in consultation over a patient who had been suffering for a fortnight from obscure symptoms of abdominal disease. The case was that of a young man about eighteen years old, of tall but spare frame. I found him lying on the outside of the bed, dressed. His countenance was sunken; his eyes bright and glassy, surrounded by deep brown rings of pigment; his breath had a most nauseous sweet odour, perceptible at some little distance.

I made him undress and get into bed, and proceeded to make a careful examination of the abdomen. It was greatly distended, but not uniformly. For while the whole of the lower part of the belly was full and rounded, and the left hypochondrium was equally so, the right hypochondrium was flat, or even slightly hollowed. The separation between the rounded and the flattened regions was indicated by an oblique ridge or line descending downwards and to the right from the upper part of the left hypochondrium; and every time the patient breathed this line could be seen to descend a little, or at any rate to become more distant from the line of the rib-cartilages. The appearance of the abdominal surface may, perhaps, be made more intelligible to the reader by the accompanying diagram, which is copied from one made at the time.



From my observation of other cases in which the stomach has been enlarged, I at once came to the conclusion that the abdominal distension in this case was due to dilatation of the stomach. This conclusion was confirmed by the fact that a splashing sound of fluid mixed with air could be easily produced by manipulation of the lower part of the abdomen. The percussion note over the whole belly was tympanitic, a full sonorous note being obtained. There was no increase of liver dulness.

On inquiring into the history of the patient's illness I learnt that until fourteen days before he had been in his usual health. He was probably not of very good constitution, for his mother had died of phthisis, and he and his brothers and sisters were all spare and delicate-looking. He had been subject to some affection of the throat, probably chronic enlargement of the tonsils. He assured me that he had never suffered from indigestion or pain after food.

On the day when his illness commenced (Thursday, August 15th), he went to work in the morning as usual after his ordinary breakfast of bread and butter. He had some ham for his midday dinner; I could not elicit that this was hard or indigestible. In the afternoon he came home and said that he had felt very poorly all day. He complained of severe pain in the abdomen, and was sick. The next morning (Friday, the 16th) he was again sick; the vomited matters consisted chiefly of ingesta.

After this he remained free from sickness for some days, but the pain in the abdomen continued until Wednesday, the 21st. His father also noticed that his eyes were sunken and dark.

On the 21st the pain ceased, and he remained free from it for two days. He was able to get about the house, and even to walk to Southwark Park, perhaps a third of a mile distant, and to lie on the grass. On the 23rd the pain returned, and lasted till the 26th. But on the 25th he was able to eat boiled mutton, turnips and French beans, for his dinner.

On Monday, the 26th, the pain again left him, and he said he was quite well. On Tuesday, the 27th, it was particularly noticed that he made a fair dinner of boiled mutton. This was the twelfth day from the commencement of his illness. Hitherto his friends had felt no real uneasiness about him. But about 5 p.m. on the 27th all his symptoms returned in such a form as to excite great alarm in his relations' minds. He again complained of severe pain all over the abdomen, and he was very sick. The vomited matters were now of a greenish colour and very offensive, more like fluid fæcal matter than anything else. He also brought up extraordinarily large quantities, a pint coming up at a time, and altogether it was considered that he must have vomited two gallons within the twenty-four hours. The bowels had hitherto shown a tendency to constipation, but on this day (the 27th) they acted nine times. He passed but little urine. The vomiting, after lasting twenty-four hours, ceased entirely, but in all other respects he rapidly got worse up to the time of my visiting him on the 29th. He took not the slightest nourishment, but large quantities of water and a good deal of ice.

In addition to the other symptoms which have already been mentioned as having existed at the time of my visit on the 29th, it may be stated that the pulse was 124, very feeble. The temperature in the axilla was 98·6°. The hands and feet were warm, and had been so through his illness. His tongue was fairly clean. He complained much of thirst, and had frequent eructations of wind. The bowels had acted slightly in the morning; the evacuation was shown to me, and consisted of a scanty unformed mass of dryish fæces.

The opinion which I formed about the case was that, whatever the original disease, his distress was now mainly caused by

dilatation of the stomach; that this organ contained a large quantity of fluid, but was paralysed from over-distension, and unable to rid itself of its burden; that if we could pass a stomach-pump tube and empty the stomach, and afterwards feed the patient by nutrient enemata for a time, it was possible that his life might be saved.

I therefore suggested that he should be moved into the hospital; and his medical attendant, Mr. Hooper, seconded this advice. The patient himself was not unwilling, but his other relations refused their consent in the absence of his father, who had been telegraphed for from Portsmouth, and whose arrival was expected every hour.

We therefore prescribed a mixture containing bismuth, nux vomica, and a little morphia; and gave directions that he should have nutrient enemata at fixed intervals, and that nothing but a little ice should be given him by mouth.

Early on the morning of the 30th I again visited him, and found that his condition was decidedly worse. He had had no sickness, but the stomach was more distended, the line indicating the margin of the lesser curvature being much higher, or nearer the ensiform cartilage. His pulse had risen in frequency. His friends were most distressed about him, and were fully convinced that unless relieved he could not live through the day.

As permission to move him into the hospital was refused, and as it was indeed very doubtful whether he could bear such a journey, I arranged to visit him again as early as possible in the afternoon, and to make the attempt to give him relief by means of the stomach-pump.

About 2 p.m., therefore, I returned to the house, accompanied by one of the dressers at the hospital, Mr. Maurice Duke. The condition of the patient was not materially altered, and he was perfectly conscious and very desirous that we should carry out the measures we contemplated.

The stomach-pump tube was introduced without any difficulty by Mr. Maurice Duke. Even while it was being passed it provoked the expulsion of a greenish fluid, which gushed out from the mouth by its side and through its open end; and when it had entered the stomach a similar fluid was ejected through the tube with considerable force. When a few ounces had been collected its spontaneous discharge ceased; the stomach-pump

was then fitted to the end of the tube, and each stroke of the piston brought away a full supply of the liquid. After a time this came less freely; a few ounces of slightly tepid water were then injected, and on reversing the action of the pump afterwards it was found that still more fluid could be withdrawn. The same thing was repeated more than once, the water injected on one occasion being quite cold.

The effect of the operation on the contour of the abdomen was most marked. The distension rapidly subsided, and before the stomach-pump tube was withdrawn, the belly had become deeply hollowed. It was thought advisable to apply mechanical pressure, as is done after childbirth and after the operation of paracentesis abdominis; a cloth was therefore folded so as to form a broad pad, this was placed on the flat abdomen, and over it a jack-towel was bound tightly round the body.

The fluid removed was found to measure a gallon and half a pint. This included the water that had been injected, which was estimated to have amounted to a pint and a half. This would leave seven pints as the quantity extracted from the stomach. It was a thin watery liquid, pretty uniform in consistence, depositing a slight granular sediment.

After the removal of the tube the patient said that he felt much relieved, and that his pain was all gone. He turned on to his side of his own accord. His pulse was of about the same frequency as before the operation, but seemed to have more volume.

A pint of beef tea, with a wineglassful of brandy, was now injected per rectum. As he complained much of thirst, his mouth was wetted with a little weak brandy and water, and directions were given that he might have small quantities of ice to suck, but that he was not to have any liquid given him to drink.

About an hour and a half later Mr. M. Duke visited him again, in order to give him a subcutaneous injection of morphia, for it was deemed important to secure sleep, as he had had none for several nights. Mr. Duke found, however, that he was very drowsy, and that it was scarcely possible to get an answer from him. His pulse was 144; his temperature 102·7°. An hour later he quietly died, at 6.30 p.m.

The post-mortem examination was made the day after death by Mr. Maurice Duke, in my presence. The friends felt strong

objections, and consented to the autopsy only in consequence of my urgent representations of its necessity. The exploration was limited to the abdomen, and the organs were examined *in sitú.*

The abdomen was found to be slightly less hollow than immediately after the operation on the previous day, but it was not at all distended; it was beginning to turn green from decomposition.

On making a vertical incision the stomach was seen in a natural position, projecting, perhaps, an inch or a little more below the left lobe of the liver. Its outer surface was of the natural colour. It showed no marked excess of vascularity. There was no sign of even commencing inflammation of its serous coat.

Below the stomach various parts of the intestines lay on the surface. The coils of small intestine were, without exception, contracted rather than dilated; the transverse colon also was of moderate size. On the other hand, the cæcum and ascending colon were decidedly distended by gas and fluid, which could be made to produce a splashing sound when these parts of the bowel were disturbed in their position. The ascending colon made a bend downwards before passing up to the hepatic flexure, so that it and the cæcum were much more widely in contact with the parietes than usual, and pushed the ileum and jejunum more towards the left side of the abdomen.

In moving these folds of the ascending colon it was discovered that there was a little patch of lymph at one spot on the peritoneum passing from the large bowel to the mesentery of the small intestine, and a moment later the serous membrane gave way at this spot, and a thin fetid fluid with air exuded. This was found to come from a large cavity situated behind the ascending colon, gall-bladder, and other parts, all of which were fixed together by firm fibrous adhesions of old date.

From the imperfect and hasty character of the examination it was not possible to determine the precise limits nor the origin of this cavity, in which the finger could be moved freely for a considerable space; it probably communicated with the intestines by more than one aperture. There was one very large opening into the duodenum, just where the gut was bending round the head of the pancreas; in fact, a finger passed into the duodenum through the pylorus went straight into the cavity, and it was at first supposed that the whole calibre of the

second portion of the duodenum had sloughed away. Subsequently, it was found that the duodenum passed down on the inner side of the cavity. Besides a considerable quantity of fetid fluid the cavity contained a large-sized slough, some inches long, apparently the remains of a mass of connective tissue. The kidney lay behind the cavity, and was healthy.

Before cutting into the stomach I pulled it down by means of the omentum, and endeavoured to stretch it. I then found that it could easily be drawn down to a very considerable extent; not, indeed, so as to reach the pubes, but so as to come considerably below the umbilicus, and probably half way down between it and the pubes.

The walls of the stomach were of the natural thickness. The pylorus was perfectly free. The gastric mucous membrane was much ecchymosed. The organ contained very little fluid, perhaps half a pint; this was of a green colour, precisely like what had been removed during life. Microscopically it showed a good many masses of sarcinæ, some few with sharp edges and well defined, the majority consisting of rounded indefinite clusters, but still presenting sufficient indications of their nature to enable them to be recognised.

My recognition of the fact that the stomach was dilated in the case just related, and my conviction that this condition might probably be remedied by the employment of the stomach-pump, depended on my recollection of a somewhat similar case that had occurred in the hospital nearly two years before, under the care of Dr. Rees, who has most kindly allowed me to relate it in this paper.

Case 2.—*Acute dilatation of the stomach, fatal after three days' illness; absence of all other disease on post-mortem examination; return of the stomach to its proper size when emptied of its contents, after removal from the body.*

William S—, æt. 30, was admitted into Guy's Hospital, under the care of Dr. Rees, December 7th, 1870. He had been in the army for sixteen or seventeen years, and was in receipt of a pension. He had always had good health until January, 1870, when he was attacked with rheumatism. Since that time he

had not been well. He had formerly had syphilis. In August last he was in the hospital under the care of Dr. Habershon, suffering from pain and stiffness in the back.

In the course of the month before his admission he spat a little red blood. This fact and the loss of flesh he had undergone led to his chest being minutely examined, and it was thought that some doubtful signs of pulmonary disease were discovered. Cod-liver oil was prescribed for him.

On December 15th he was taken with sickness, which lasted all night; it was attributed, both by the patient and by the sister of the ward, to the cod-liver oil he was taking. However, the sickness persisted.

On December 17th, when Dr. Rees visited the ward, he was informed that the man had passed no urine for two days. A catheter was passed; but three or four ounces of urine only were drawn off.

On examining the abdomen Dr. Rees found that there was dulness on percussion above the pubes, and he therefore directed that the catheter should be again introduced, but no urine was obtained.

On Sunday morning, December 18th, happening to be in the hospital, I was asked by the house-physician, Dr. de Liefde, to look at this patient, as there was a doubt whether there might not be some mechanical obstruction of the bowels. The sickness still continued. The bowels had been confined for two days, but an injection brought away two fæcal evacuations. The man looked very anxious and distressed. The pulse was feeble, the temperature below the normal.

The abdomen was in no degree distended, but the contrary. The recti muscles were very rigid, especially the upper portions of them, which stood out prominently, with the lineæ transversæ delineated through the integuments. The percussion note was generally tympanitic; but above the pubes, for, perhaps, half the distance between it and the umbilicus, there was dulness. No tumour could be felt resembling in outline a distended bladder. On giving a smart tap to this region, or to any part of the iliac fossa, a loud splashing sound was produced, evidently due to the admixture of fluid and air.

I examined the chest, but could find no decided evidence of disease in any particular region. I was unable to form any

opinion as to the cause of the sickness, or the nature of the abdominal mischief.

His pulse gradually became more and more feeble, and he sank the same afternoon.

I made a post-mortem examination the following day, in the absence of Dr. Moxon.

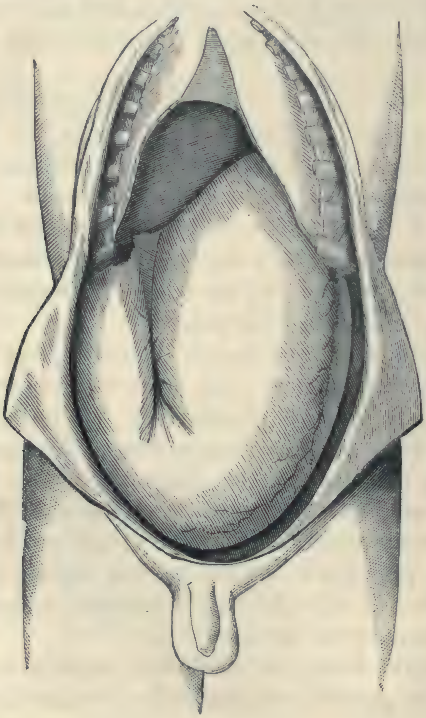
The brain was healthy.

The lungs were very œdematous, especially their upper lobes. The lower parts of both lungs were much softer and more lacerable than natural; but there was no marked hepatization at any point. No tubercle was anywhere found.

The larynx and air-passages were full of frothy fluid.

The heart was healthy; owing to the arched position of the diaphragm, its apex appeared to lie between the fourth and fifth ribs.

When the abdomen was opened the stomach was almost the only organ visible. The accompanying diagram, which has been copied from one made at the time, shows the relations of



the parts. The stomach passed from the under surface of the diaphragm downwards as far as the pubes; an oblique line traced in this direction was found to measure thirteen inches. The organ then bent sharply upwards to reach the under surface of the liver, where the pylorus lay in its natural position; a line traced obliquely upwards from the lower end of the other line at the symphysis pubis measured eight and a half inches. The greater curvature of the stomach thus followed the curve of the abdominal cavity; the lesser curvature was bent sharply on itself at an angle. In this acute angle a hard substance (apparently part of the pancreas) could be felt and seen through the thin gastro-hepatic omentum. The greater omentum lay folded up immediately below the stomach, in the small space between it and the abdominal walls; when drawn out, it reached halfway down to the knees. The transverse colon was empty and contracted, and lay behind and below the stomach; the left part of it was directly in contact with the sigmoid flexure. The small intestine was empty and narrow, so that it was not thicker than a finger; almost the whole of it lay in the pelvis, where its coils were bent and packed closely one upon another, so that they had lost their rounded contour, and looked quite angular. In opening the abdomen the stomach was wounded, and part of the greenish-brown fluid which it contained escaped into the abdominal cavity. Consequently, the organ was comparatively flaccid, when I saw it: but the state of the small intestine shows that it must previously have been very tense and have exerted great pressure on the surrounding parts.

The liver was pushed upwards beneath the ribs. It was healthy, as was also the gall-bladder. The right supra-renal capsule was natural in appearance. The left capsule was destroyed in removal. The spleen was small and firm. The kidneys were healthy. The bladder was contracted behind the pubes.[1]

[1] I cannot refrain from one observation as to the difficulty which arose in this case in determining whether the bladder was or was not distended. For, only a month before, I had been placed in a very similar difficulty in respect to a case of intestinal obstruction. A man was admitted into Guy's Hospital under the care of Dr. Wilks, suffering from obstruction of the bowels. The constipation had lasted eight days, but he said that the motions had previously been narrow. He had had comparatively little sickness, and the vomiting had never been stercoraceous. He had passed no water since the day before. Above the pubes, half

Thus, no disease was found in the body to which the death of the patient could be attributed, except the dilatation of the stomach. And, next to the fact of the extreme degree of this dilatation, the most remarkable feature of the case was the circumstance that when the organ was removed from the body it was found to have resumed nearly its normal size. When allowed to fall, as nearly as possible, into its natural curve, the length of the organ, from the convexity of its fundus to the pylorus, was found to measure eleven inches. The only sign of the distension which remained consisted in the presence of a number of fine white striæ, visible on its serous surface, and apparently analogous to the well-known *lineæ gravidarum.* The mucous membrane had fallen into folds, presenting the usual reticulated arrangement. It showed a finely punctated ecchymosis at some points. Near the lesser curvature were some white points, apparently solitary glands. The muscular coats of the stomach were well marked, per-

way up to the umbilicus, there was dulness on percussion, and it was believed that the rounded outline of the bladder could distinctly be felt.

Although the patient's general condition was one of marked collapse, it was thought that the balance of probability was in favour of the original cause of the obstruction being some chronic stricture of the large intestine. No doubt was entertained as to the presence of a considerable quantity of fluid in the bladder, although it was surmised that the collapsed state of the patient might have diminished the secretion of urine and prevented its further accumulation. A catheter had been passed when the man was first admitted, but only a few drops of urine were obtained. When I saw him, late in the evening, instruments were again passed, both by the house-surgeon and by Mr. Howse. No urine was obtained. It was determined to watch the patient's condition for two hours, and at the end of that time to consider the propriety of puncturing the bladder. In the mean time the patient died. On post-mortem examination the cause of the obstruction was discovered to be the appendix vermiformis, adherent at its extremity, strangulating a coil of small intestine which descended into the pelvis. This coil lay in the recto-vesical pouch, and had dilated it into a rounded cavity. The bladder (which was quite empty) was thus pressed forward behind the pubes; and it is probable that the prostate may have been pushed downwards, and that its displacement may have given rise to the opinion of the surgeons that the catheters had not entered the bladder. It was certain that at least one instrument must have been introduced into its interior, for its mucous membrane exhibited a distinct linear ecchymosed laceration near the exit of the urethra.

The dulness above the pubes and the apparent vesical tumour were due simply to the presence of some fluid in two or three coils of small intestine which lay in that position.

haps rather thicker than natural. The pylorus was of its normal diameter, and contained a decided muscular ring, but presented no sign of disease.

So far as my reading has gone, such cases as those above related are exceedingly rare. The nearest approach to them that I have met with is a case recorded in the fourth volume of the 'Path. Trans.,' by Dr. Miller and Mr. Humby, of which the following is a brief abstract:

Mrs. M—, æt. 48, was seized with vomiting, which continued the whole of the night of March 6th, 1853. The fluid ejected amounted to as much as five handbasins-ful. The next morning she was faint and weak, the pulse not above forty in the minute and intermitting. The abdomen was lax and soft, without pain on pressure. She had recently been under medical care for piles and prolapse of the rectum. She had been getting thin recently, and her daughter had observed a slight increase in the size of the abdomen. On the 8th the vomitings had somewhat diminished; the abdomen was sunk and depressed; little gurgling was heard in the region of the stomach. On the following day the vomiting had subsided, but the patient appeared more depressed and ill. The bowels were relieved by means of an injection. On the 10th the severe vomiting ceased. A considerable swelling of the whole abdomen was now discovered, commencing about the left iliac region, *except that part on the right side of a line drawn from the ensiform cartilage to the right superior spinous process of the ilium. The swelling was tympanitic.*

On the 11th the swelling, instead of being tympanitic, was dull on percussion, and fluctuated; the patient experienced an inclination to vomit when pressure was made over it. For the next three days she continued in the same state, the abdominal tumour being larger and fluctuating; the general symptoms were those of exhaustion, but with complete absence of pain, sickness, or natural action of the bowels.

On the 14th Dr. (Sir Thos.) Watson saw her, who expressed an opinion as to the difficulty in forming a correct diagnosis of the case, but believed it to be one of preternaturally distended stomach containing fluid, and that there probably existed some

mechanical obstruction of the bowels. On the following day she became delirious at times. On the 16th Dr. Bright saw her, who did not come to the same conclusion as to the nature of the case as Dr. Watson. On the 17th she expired.

Mr. Humby examined the body. The viscera of the abdomen were found to be healthy; but the stomach, distended to an enormous size, occupied the whole site of the abdominal tumour.

A woodcut which accompanies the record of the case in the 'Path. Trans.' shows the stomach filling the whole abdomen, below and to the left of the line referred to above as passing from the ensiform cartilage to the right crista ilii. In many places the muscular fibres of the stomach had completely given way, so that the mucous and peritoneal coats were approximated. The cavity of the stomach was capable of holding ten and a half pints of fluid. The small intestines were contracted to a very small size, and completely pushed down into the cavity of the pelvis.

The fluid rejected from the stomach was found to contain abundant specimens of the *Sarcina ventriculi.*

It will be granted, I think, that there is a close general similarity between the case I have just quoted from the 'Pathological Transactions' and those which form the subject of this paper. Taken together, they show that dilatation of the stomach may be attended with symptoms of great severity, of sudden onset, and leading within a few days to a fatal termination.

A disease so rapid in its course may, I think, be fairly termed "acute," by way of distinguishing it from the chronic dilatation that is a sequel to obstructive disease of the pylorus, or that may sometimes occur independently, as in Andral's case quoted in the first page of this paper. But it can hardly be supposed that the dilatation itself is so rapid in its development as its symptoms are sudden. In this respect Mr. Humby's case is very instructive, in which the patient's daughter had observed a slight increase in the size of the abdomen for some time before the sudden attack of profuse vomiting, which first led her medical attendant to suspect the existence of abdominal mischief.

The physical characters of acute and of chronic dilatation of the stomach appear to differ in some important respects. In

both the lower part of the abdomen is occupied by a rounded tumour, in which gas and fluid exist, and may be made to produce a splashing sound by manipulation. But, whereas in chronic dilatation the left hypochondrium is generally hollowed, in acute dilatation it is as full as the hypogastric region itself. This appears to depend on the different degrees of distension in the two cases. In chronic dilatation the stomach is a large loose bag, only partially filled, which naturally bulges most at its lower part. In acute dilatation the organ is as tense as it can possibly be.

Again, visible peristaltic movements afford important aid in the diagnosis of chronic dilatation of the stomach. In the acute form of the disease they have not yet been observed. And I think it is probable that in the latter case the contractions of the organ would be too feeble to be seen through the abdominal parietes, the muscular fibres being extremely attenuated, whereas in chronic dilatation they are often greatly thickened and hypertrophied. The distinction would be parallel to that which I have pointed out in a former volume of these Reports as obtaining in the several forms of intestinal obstruction, so far as visible peristalsis of the intestine is concerned.

The vomiting in cases of acute dilatation may probably at first present nothing to distinguish it from that which occurs under a variety of other conditions, or the quantity of fluid discharged from the stomach may within a few hours be so great as to arrest attention. In the latter case the cavity may be so completely emptied that for a time the abdomen may regain its natural appearance, and no sign of gastric enlargement be left. If under such circumstances the patient should be absolutely forbidden to eat or drink, and if nutrient enemata should be used to maintain life for a few days, it may, perhaps, be hoped that the stomach would regain its tone. But when solid and liquid food are freely permitted, the dilatation and distension soon return, and with them the tendency to vomit.

After a time, however, the vomiting in most cases ceases. The cause of this appears to be that the muscular coat of the organ is paralysed. Like a distended urinary bladder, it is unable to empty itself, and it continues rapidly to increase in size. In Dr. Rees's case, indeed, the sickness continued to the last. But I think that it is probable that in this instance

vomiting was effected not by the walls of the stomach, but entirely by the abdominal muscles. For I noticed particularly that the walls of the abdomen were exceedingly rigid, the recti muscles, with their lineæ transversæ, being plainly seen through the integuments.

The appearance of the vomited matters is mentioned in only one of the cases. They consisted of a thin greenish-brown liquid, very offensive, very like that which is discharged in the earlier part of the course of a case of intestinal obstruction, and, no doubt, containing bile and other matters derived from the upper part of the small intestine. There was no frothy scum, such as is seen in cases of chronic dilatation, when sarcinæ are very abundantly developed. But it is nevertheless noticeable that in two of the cases sarcinæ were discovered in greater or less number. In both these instances the stomach was found to be ecchymosed, a fact of some interest as bearing upon the opinion lately advanced, that, instead of being vegetable organisms, sarcinæ arise from aggregations of red blood-discs.

The following conclusions appear to me to be fairly deducible from the cases above related:—

1. Acute dilatation of the stomach may arise in young subjects, in whom that organ has previously been apparently healthy. The actual process of enlargement is probably more or less gradual; but it at first produces no symptoms, and when these occur they are sudden in their onset, and of great severity, and may destroy life in a few days.

Acute dilatation of the stomach may be the only disease found in the body after death, or it may have supervened upon some other morbid change in the alimentary canal.

2. Its signs are (1) a rapidly increasing distension of the abdomen, which is unsymmetrical, the left hypochondrium being full, while the right hypochondrium is comparatively flattened; (2) the existence of a surface-marking descending obliquely towards the umbilicus from the left hypochondrium, and corresponding with the dropped-down lesser curvature of the stomach, this line appearing to descend with each act of inspiration. (3) The presence of fluctuation in the lower part of the abdomen. (4) The occurrence of splashing when the dis-

tended part of the abdomen is manipulated. (5) The presence of an uniformly tympanitic note over a large part of the distended region when the patient lies flat on his back. Above the pubes, on the other hand, there may be dulness on percussion simulating that of a distended bladder.

If the abdominal walls be very rigid, and the recti muscles prominent, the characters numbered under (1) and (2) may be absent, but those numbered (3) and (4) remain. If the patient have recently vomited a very large quantity of liquid, all the physical characters of dilatation of the stomach may probably for the time disappear.

3. Its symptoms are those of severe abdominal disease, without evidence of peritonitis or lesion of the intestines. The eyes are sunken and surrounded by brown rings; the features pinched and drawn; the breath has a nauseous odour. There is very profuse vomiting, so that several quarts may be evacuated in the twenty-four hours. After a time, however, vomiting may cease entirely, the stomach being paralysed, and unable to get rid of its contents. There is no absolute constipation, although the bowels may be more or less confined. The urine is very scanty.

4. The stomach may be so greatly dilated that when the abdomen is opened after death it is the only organ visible, or that has been in contact with the anterior abdominal wall below the liver. Yet after its removal from the body, and the letting out of its contents, the stomach may shrink back to its natural size, and the only remaining indication that it had undergone such extreme distension may be the presence of slight lacerations of its coats.

5. If acute dilatation of the stomach be recognised during life, and the stomach-pump be employed, its contents may be almost completely evacuated. The organ then quickly returns to its natural size and position. The pain and distress suffered by the patient may by this procedure be entirely removed, and there is reason to hope that it may save the life of the patient, provided always that the general symptoms be not already too severe, and that there be no other disease to which he must necessarily succumb.

Since this paper was written, my friend Dr. Hartree has

pointed out to me that Dr. Hughes Bennett has recorded in his 'Principles and Practice of Medicine' a case somewhat similar to mine. The case comes under "Diseases of the Respiratory System," because the patient suffered from empyema, and it had thus escaped my notice. I append an extract from Dr. Bennett's report:

"Allan B—, æt. 26, a gilder, admitted November 26th, 1856. . . . . .

"December 13th.—Last night about 11 o'clock he was seized with severe pain in the upper part of the abdomen, which prevented him from sleeping. This morning the pain still continues; it is increased by firm pressure, but he can easily bear slight pressure. Respiration is abdominal as well as thoracic. Appetite gone; bowels opened freely a few hours ago; dejections natural. Pulse 108, small, but not hard or strong. Skin hot; the look is not particularly anxious.

"15th.—Continues to complain of abdominal pain. Yesterday four loose stools were passed, which produced considerable uneasiness. To-day he has had but one stool. There is considerable tenderness on pressure, and distension from tympanitis over the whole left flank. Pulse 96, feeble, soft.

"16th.—He was greatly relieved, and he continued in a comfortable condition till the 18th. On the evening of that day he was attacked by vomiting and a sensation of fulness in the abdomen, both of which he believed to be due to his having taken a quantity of lemonade. The vomiting continued till 11 p.m., when it ceased. The matters vomited were partly fluid and partly solid, and evidently consisted of alimentary substances. Tenderness on pressure in the region of the recti muscles; bowels opened this morning; dejections natural. Respirations 30, somewhat laboured; pulse 120, small, somewhat hard, but quite compressible; consciousness perfect; skin hot and dry, cheek flushed.

"19th.—A remission of the symptoms took place. On the 20th vomiting recurred, together with abdominal pain and tenderness, as described in the report of the 18th. These continued to become severe till the morning of the 22nd, when he sunk, with all the marks of great depression of the entire system. He died at 2 a.m. on the 22nd."

On post-mortem examination, twenty-eight hours after death, it was found that "the stomach was enormously dilated, extending to the pubes, and concealing all the abdominal viscera, except a portion of the right lobe of the liver and colon. On opening it it was found to be distended with air, and somewhat twisted round on itself at the junction of the cardia and œsophagus. All the coats were very thin, apparently from the distension. The mucous coat was healthy, and no abrasions could be discovered in it. But between the serous and muscular, as well as between the muscular and mucous coats, numerous bullæ of air were visible, which could be moved about by pressure of the fingers, evidently dependent on the presence of some gas in the texture, which was in no way putrid, nor was the gas of fœtid odour."

The following extract is from Dr. Bennett's commentary on the case:

"The mode of death in this case was very remarkable, and, indeed, so far as I am aware, unique. The man, to relieve his thirst, was allowed two or three bottles of effervescing lemonade as drink during the day. It would appear that on the 15th of December he complained of fulness of the stomach and tympanitic distension of the abdomen, which symptoms, however, excited no great attention, although they may have originated in the same cause which apparently produced the more violent complaint that came on subsequently. On the evening of the 18th he was seized suddenly with all the symptoms of perforation of the bowel, and on examining him next day such was what I believed to have occurred. There was great abdominal tympanitic swelling, excessive pain, vomiting, &c. But on dissection we found that these symptoms depended upon great distension of the stomach, with emphysema of its coats, the latter a lesion which I believe was then observed for the first time. It was not caused by putrefaction, and the question arose, How was it produced? It turned out, on inquiry from the nurse and neighbouring patients, that the man had kept his bottles of effervescing lemonade till the evening, and drank at least the contents of two of them in quick succession. It is probable, therefore, that the exhalation of gas had distended the stomach, and caused it to twist round partly on itself at the cardia, so as to prevent its escape. Hence the distension and

pain, and why, probably, the contained air, not finding a ready exit through either the cardia or pylorus, had forced its way between the coats of the organ itself."

I confess that I should be disposed to leave the origin of the distension unexplained, or to refer it to the same unknown cause as that which operated in the cases related in the present communication, rather than to suppose that gas sufficient to dilate the stomach so greatly could be generated by two or three bottles of lemonade.

A CASE

OF

PATENT DUCTUS ARTERIOSUS,

ATTENDED WITH

A PECULIAR DIASTOLIC MURMUR.

By C. HILTON FAGGE, M.D.

In the last volume but one of these Reports, in a paper on the subject of mitral stenosis, I described a case which had been under my observation in which a murmur was audible entirely different in character from any bruit that I had ever before heard. Two views as to its cause suggested themselves to my mind—one that it was due to a communication between the aorta and the pulmonary artery; the other, that it was a modification of an auricular systolic murmur. The patient had left the hospital when my paper was written, and there seemed but little probability of my being able to ascertain which of these views was correct. Within the past year, however, she has been readmitted, and has died, and on post-mortem examination it has been found that the only lesion to which the peculiar bruit could be attributed was a patent ductus arteriosus. The case appears to me to be of sufficient interest to justify my reprinting from my previous paper the detailed account of the murmur which was heard when she was before admitted into the hospital (op. cit., pp. 326 et seq.).

"Harriet H—, æt. 42, was admitted into the clinical ward under the care of Dr. Fagge, July 3rd, 1869. She has never

had rheumatic fever. She has had four children and was confined six months since; after her confinement her abdomen gradually began to swell. For the last six weeks she has not been out of bed. Her breath has been very short, and she has had a bad cough and has spat blood and matter. Her breath is better now, but she has not been able to lie down during the last few nights.

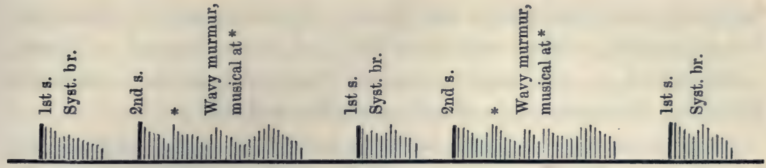
"The enlargement of the abdomen is principally in the antero-posterior diameter, but there is a little lateral bulging. There is resonance on percussion from above to within three inches of the umbilicus; below this and in the loins the percussion note is dull. Fluctuation is distinct in all directions.

"The pulse is extremely slow, 34 when first counted, 43 when the report of her present condition was being taken. The heart's impulse is widely diffused. Even the sternum is slightly raised by it, and it can be plainly felt even to the right of that bone. It also reaches externally to the left nipple. The most definite 'apex beat' is situate between the fifth and sixth ribs. Here there is a distinct drawback, and at times, I think, a feeble subsequent pulsation can be felt following the first.

"The systolic murmur appears loudest and most blowing between the fourth and fifth costal cartilages, near the sternum; its intensity diminishes both towards the axilla and towards the ensiform cartilage.

"Below the fifth rib the second sound, although rather thick and like a 'thud,' is not followed by any murmur. But above this region it is followed by a most remarkable wavy bruit. This wavy bruit is, and always has been, loudest about the second left costal cartilage, close to the sternum, and it has at this spot a musical quality, almost wanting elsewhere. Here, also, I think that there is no interval between the second sound and the bruit; but lower down there is an interval, the bruit seeming to belong to a distinct movement of the heart or of some large vessel during the pause.

"The rhythm of the heart-sounds at the base may be best indicated by the accompanying diagram.



"It will be observed that the peculiar features in this case were extreme slowness of the pulse, and the presence of a wavy, partly musical murmur audible at the second left costal cartilage, extending considerably to the left of the sternum along the cartilage, not carried along the sternum downwards, following the second sound, but not everywhere continuous with it, separated from the next first sound by a considerable interval. It occurred, therefore, during the diastole, at a time when the whole of the heart is naturally at rest, and yet it gave one the impression of being produced by the tumbling, rolling movement of some part of the organ.

"Two views suggested themselves at the time as possible explanations of this remarkable bruit.

"Firstly, it appeared to be conceivable that, supposing an opening to exist between the aorta and the pulmonary artery, the recoil might cause a higher pressure in the one than in the other vessel, and so a flow of blood through the opening, producing a bruit.

"Secondly, it appeared possible that the case might be one of contracted mitral orifice, and that the basic murmur might be due to the systole of an hypertrophied auricular appendix, occurring so early that it seemed to follow a second sound rather than to precede the next first sound.

"In favour of this last view it was noted that occasionally a slight second beat seemed to be discoverable at the apex. One could explain this by supposing it to be due to the flow of blood through a narrowed mitral, impinging on the point of the left ventricle; it would have been unintelligible on the other hypothesis.

"Opposed to the view that the case was one of contraction of the mitral orifice was the fact that no presystolic murmur was ever audible."

On February 28th, 1872, the same patient was readmitted into the hospital under the care of Dr. Wilks. She was exceed-

ingly ill, and unable to lie down. Her face was flushed, but her skin cold. She said that she had been tapped at home, and that the parietes had afterwards given way at the umbilicus, allowing the escape of a large quantity of fluid.

On auscultation a loud systolic murmur was heard at the heart's apex. I listened very carefully for the peculiar bruit at the apex, but, if audible at all, it was exceedingly faint, and certainly no unusual sound would have been noticed if attention had not been specially directed to it. The heart's pulsations were still only forty in the minute.

Very few notes of her case were taken during the fortnight that intervened between her admission and her death. On March 2nd it is recorded that four punctures were made in the thighs. On the 7th the pulse was 48 per minute. On the 8th she was almost pulseless, her face and lips were purple.

She died on March 13th.

I made a post-mortem examination on the following day (March 14th).

The body was moderately emaciated ; there was considerable œdema of the legs, with inflammation of the skin.

The head was not examined.

The right pleural sac contained much fluid of a straw-yellow colour. The lower lobe of the right lung was compressed and airless. The bronchial tubes in both lungs were reddened, containing much mucus.

The heart weighed twenty-two and a half ounces. Its apex was rather rounded. The left ventricle was dilated and hypertrophied (a condition ascribed to the renal disease which was afterwards found), and the right ventricle likewise in apparently about equal proportion. The right auricle was greatly more dilated than the left, its appendix was opened out, and its enlargement might fairly be said to be extreme. The endocardium of the right auricle was opaque. The foramen ovale was closed. The tricuspid orifice was much enlarged, admitting five or six fingers. The muscular substance of the right ventricle was hard and tough.

The mitral valve allowed four fingers to pass its orifice. In the endocardium of the left ventricle, about the musculi papillares and elsewhere, there were numerous yellow opaque patches, but the muscular substance was healthy.

The aortic valves were healthy, but much smaller than the pulmonary valves. The base of the aorta also was much less in size than the base of the pulmonary artery, and the two primary divisions of the pulmonary artery were greatly dilated, especially the right one; but the coats of the pulmonary artery were apparently not thickened, bearing their natural proportion to those of the aorta.

The ductus arteriosus was patent, allowing a 6 or 7 catheter to pass through it. It formed a short canal, communicating with the aorta by a somewhat oblique opening. (See Plate.)

The peritoneal cavity was divided into a number of distinct chambers by adhesions. Thus, there was one above the transverse colon, another in the centre of the abdomen, and a third in the right loin—all quite distinct from one another. There were also numerous adhesions, which formed more partial septa. The mesentery was much contracted, and the intestines were matted together. (It may, perhaps, be doubted whether the peritonitis which led to these changes was set up by the operation of paracentesis; but, on the other hand, it is to be remarked that when she was first admitted into the hospital the physical signs presented by the abdomen were such as to suggest the opinion that the abdominal enlargement was due to some form of "encysted dropsy.")

The liver weighed sixty-four ounces. Its capsule was greatly thickened and opaque. The gall-bladder wss thickened and narrowed, so as to be hidden from view beneath the opaque capsule. The whole liver was rounded and deformed. On section the hepatic veins were intensely congested.

The spleen was firm and hard; it weighed eleven ounces.

The kidneys weighed eleven and a half ounces. The cortex was granular on the surface, and much narrowed. There were numerous cysts.

The uterus was healthy, but its mucous membrane stained with blood.

When discussing, at the bedside of the patient, the cause of the remarkable bruit which was heard during her stay in the hospital in 1869, I often used to refer to the well-known case in which Dr. Wade, of Birmingham, correctly diagnosed the exist-

ence of a communication between an aortic aneurism and the pulmonary artery. And after the autopsy, when a communication between the aorta and the pulmonary artery had been found in the case of H. H—, I turned again to the forty-fourth vol. of the 'Med.-Chir. Trans.' to see how nearly Dr. Wade's case and my own might resemble one another. The following is Dr. Wade's description of the bruit which he heard:

"On the cartilage of the fourth left rib two loud murmurs were heard, instead of the usual cardiac sounds, that with the second sound being of a hissing character, and so prolonged as to continue till the commencement of the next ventricular systole. At this same spot a very considerable purring tremor accompanied the second murmur. The first murmur was of a loud bellows character. Both murmurs were audible as high as the bifurcation of the common carotids, in the back, and over all the upper part of the chest; they did not seem to be peculiarly propagated towards the left subclavicular space. At the apex of the heart a single murmur only was to be heard, and this evidently attended, or rather replaced, the cardiac first sound; it could be heard easily down to the ensiform cartilage. At the apex the cardiac second sound was very distinct and quite natural; no trace of murmur."

It thus appears that no very exact correspondence existed between the auscultatory sounds observed in the two cases, nor, indeed, could any exact correspondence have been looked for, since the causes of the communication between the aorta and pulmonary artery were so different. In the one (Dr. Wade's) case there was an aneurism, the size of a hen's egg, between the vessels, and the stream of the blood entering the pulmonary artery was directed somewhat horizontally and to the left. In my case the blood flowed through a patent ductus arteriosus, and therefore downwards and to the right.

But it is nevertheless true that in their main features the bruit heard by Dr. Wade and that observed by myself resembled one another; they were both diastolic in rhythm, prolonged nearly to the commencement of the next cardiac systole, and entirely inaudible at the apex of the heart.[1]

[1] Dr. Hughes Bennett has also recorded a case of aneurism of the aorta communicating with the pulmonary artery, in which a double murmur was heard at

It may be added that my case resembled Dr. Wade's in another feature, on which he rightly laid considerable stress in forming his diagnosis. The liver was enlarged, and there was evidence pointing to hepatic engorgement (in Dr. Wade's case hæmorrhoids, in mine ascites), while the lungs were comparatively free from congestion. Such symptoms certainly favoured the inference that the blood passed across from the left to the right side of the heart, without traversing the pulmonary capillaries. But it is to be borne in mind that in my case the peritoneal effusion presented some peculiar physical signs which made it doubtful whether the fluid was not encysted, and the effusion, therefore, of local origin.

Very few cases are on record in which a persistent ductus arteriosus has been believed to have given rise to a murmur. In the first volume of the 'Pathological Transactions' (p. 55) a case is recorded by Dr. Babington, in which the late Mr. Wilkinson King had diagnosticated "patescence of the ductus arteriosus," and in which a communication was found after death to exist between the aorta and the pulmonary artery in the position of the duct. The grounds of Mr. King's diagnosis are unfortunately not stated, but it could hardly have rested on any auscultatory peculiarities, for the two loud murmurs which were heard over the whole præcordial region were evidently due to coexisting disease of the aortic valves. This case is the only one mentioned by Dr. Walshe.[1]

In the 'Prager Vierteljahrsschrift' for 1862 a case is recorded by Kaulich from the clinique of Professor Jaksch, in which there was a murmur which seems to have been very similar to that heard in the case forming the subject of this paper. It is described as a prolonged diastolic rasping murmur (Feilengeräusch), most intense above the third rib. There was also a systolic murmur at the same spot. Over the ventricles, along the aorta, and also over the pulmonary artery, a sharp second sound was heard. On post-mortem examination the foramen

the base of the heart, while the second sound was clear and healthy. The sounds were regarded as "exceedingly puzzling," but the real nature of the disease was not suspected during life. ('Princ. and Pract. of Med.,' 3rd edition, p. 595.)

[1] 'A Practical Treatise on the Diseases of the Heart and Great Vessels,' 1862, p. 538.

ovale was patent, as well as the ductus arteriosus, but it appears probable that the diastolic murmur was produced in the latter. No diagnosis was made during life, although (according to Kaulich) the position and character of the murmurs justified an expectation that the pulmonary valves would be found diseased.

Other instances have been recorded by Schnitzler, from Oppolzer's practice ('Wien. Med. Halle,' 1864, v, 10; 'Schmidt's Jahrbücher,' cxxiii, p. 44), and by Skoda; but apparently without any details that would aid in the recognition of future cases.

DESCRIPTION OF PLATE

Illustrating Dr. Hilton Fagge's paper on a Case of Patent Ductus Arteriosus.

Fig. 1 represents the anterior surface of the heart, with an incision into the right ventricle. The aorta is also laid open, so as to show a probe passing into it from the pulmonary artery.

a is the cavity of the right ventricle.
b is the pulmonary artery.
c is the aorta.

„ 2 represents the base of the pulmonary artery and a portion of the aorta, the latter being turned back, so as to show the ductus arteriosus, through which the probe is still seen passing.

b is the pulmonary artery.
c is the aorta.
d is the right branch of the pulmonary artery.
e is the left „ „

„ 3 represents, more exactly than fig. 1, the form and relative size of the opening by which the ductus arteriosus communicates with the interior of the aorta.

All the figures are considerably reduced in size.

The preparation is preserved in the Museum of Guy's Hospital.

Fig. 1.

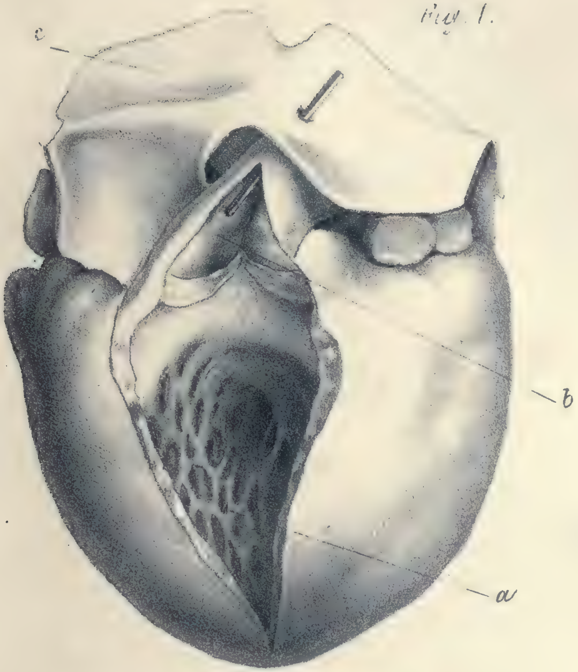


Fig. 2.

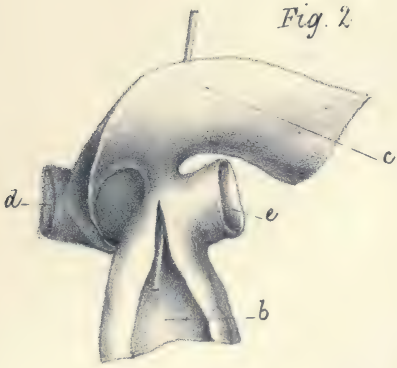
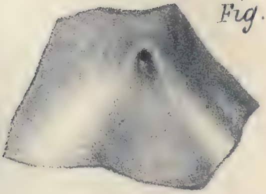


Fig. 3



CLINICAL RECORDS.

By J. COOPER FORSTER.

Another year brings round the duty of preparing for another volume of the Reports a further statement of the cases that have been under my charge. A careful selection has been made, and I have endeavoured to carry condensation of matter to the extremest limit consistent with the presentation of faithful records. Of nearly four hundred cases of which I have full notes, only sixty-three are here published in detail; some few have already appeared in print, and some are reserved for future use. I beg to return my thanks to my friend Mr. Goodhart, for the reporting and tabulation of these cases. The arrangement is the same as that adopted last year. I have in addition appended what will, I think, prove useful for reference, viz., a synopsis of the various diseases illustrated in the paper.

Case 1.—*Malignant Pustule.*

Edwin B—, æt. 19, a farm labourer, of previous good health, was admitted July 27th, 1872, with this history:—On July 20th he had a small pimple on the left side of the median line of the lower lip. This he picked while weeding his garden, and possibly his hand may have been dirty at the time. The next morning he had a good deal of pain on the left side of his face, and this side was swollen. The swelling gradually became worse and the pain also. To-day the lip commenced to discharge a little. He has had occasional headache and dizziness in his head, and has become very weak. Yesterday he had some rigors. He has not been engaged in taking care of horses. No pigs nor other animals kept.

On admission.—The lower lip is much swollen towards the left side, with slight excoriation of the surface. The left side of the face and the parotid region of the neck are also much swollen, but not the eye. The parts are somewhat elastic, but there is no fluctuation, and apparently not much pain. Very little can be seen inside his mouth. No internal sloughing can be noticed. Breath slightly offensive, tongue moderately clean.

He was ordered Quiniæ Sulph. gr. iv, Acid. Sulph. Dil. q. s., Syrupi ʒj, Aquæ ad ℥j, t. d.

28th.—Very ill this morning. Delirious at times during the night, but is quite sensible now. There is extreme prostration, with muscular tremor. The face is more œdematous, and the eye is closed, with a dusky livid red appearance of the skin. The lip now discharges some thick pus, and he expectorates a little thick tenacious muco-pus.

Temp. 104°, P. 140, R. 36. The urine runs away from him, so that it cannot be examined.

July 29th.—T. 102°, P. 128. Insensible. He has taken Brandy ℥iv during the night. The stimulant was increased to ℥xiv, but the patient died at 6 p.m.

Post-mortem.—Pus was found in the facial vein of the left side. The lungs had many small congestive pyæmic patches in them. These had not passed on to suppuration, though in one or two places the central part of the pneumonic lobule was cavitating and almost gangrenous. At the base of one lung was a large patch exactly like a pulmonary apoplexy.

This rather uncommon case is well worth perusal. It was difficult on a single observation of the patient to decide on the cause and true nature of the affection. My first impression was that probably the face had been poisoned by the application of the juice possibly of one of the euphorbiums, or other irritating acrid liquid, to some sore; but he denied the possibility of anything of the kind. Failing this, I considered that possibly it might be one of those cases of severe carbuncle which one sees occasionally on the face; though all the patients, now some five or six in number, in whom I have observed this affection, have been older than this lad; and if some of my readers consider it to be one of that class, the subject was the youngest that I have seen affected. We were then driven to the conclusion

that the disease was that known as "charbon," by the rapidity of its course, the virulence of the malady, and the absence of pus, though we failed to discover any source of animal poison.

This must have been Facial Carbuncle, or I should prefer ... cat Facial Phlebitis

Local Venereal Sores or Chancres.

Of these, thirteen cases have occurred. Seven were associated with phimosis; in the other six the sores were on exposed parts of the penis and were not accompanied by phimosis. I have detailed reports of these. Of the whole number two only were associated with bubo, and two sores were sloughing on admission. In the six unconnected with phimosis the local application of strong nitric acid very thoroughly to the whole surface of the sore, generally performed under the influence of chloroform, and repeated if necessary, together with the application of cold water dressing, constituted the entire treatment.

Of the seven cases complicated with phimosis one was attended with sloughing. The remaining six were treated on a plan that I have now adopted for many years, which, though exceedingly painful, is very efficient. It is that of applying stick nitrate of silver freely all over the contiguous surfaces of glans and prepuce. This, generally, if thoroughly applied, arrests the discharge from the sores in three or four days, and in the course of a week enables the patient to retract the prepuce. The local application of nitric acid is seldom required afterwards.

Syphilis.

There were five cases, accompanied with secondary eruption, scarcely requiring detailed reports; one was accompanied with a sloughing chancre also, and in this the sore was situated around the meatus. They were all treated by mercury in the form of Pil. Hydrargyri gr. iij, bis die. As regards the sloughing sore nitric acid was applied in that case; and the sore involving the meatus, most troublesome as such always are, had in addition a coating of nitrate of silver daily applied by brushing the surface over. A protecting eschar was thus formed for the granulations against the urine, as it flowed over the abraded surface, and the sore healed underneath the scab. The length of time that will elapse when some such application is not made

use of is wonderful. It plainly points to a local source of irritation, independently of the poison; and this is to be found in the urine.

Case 2.—*Syphilitic Ecthyma.*

George P—, æt. 17, costermonger, admitted January 10th, 1872. Has several times been in the way of getting venereal disease, but has never had a sore to his knowledge. He has had some lumps in the groin, but no sore throat. Has also had hoarseness from holloaing.

On admission.—The legs and buttocks are covered with old cicatrices and sores of irregular shape. All the fresh patches are covered with brown scabs, from beneath which exudes purulent material. Some cicatrices of ulcers of the same kind are to be seen on the hands and forearms, but the trunk is perfectly free. No cicatrix on the penis.

The rash being undoubtedly syphilitic from its nondescript character, &c., he was ordered iodide of potassium in five grain doses three times a day in water.

The medicine was continued up to February 7th, 1872, and many of the sores healed, though some still remained; he then left the hospital at his own desire.

Case 3.—*Syphilitic Ecthyma.*

Catherine A—, æt. 19, from Dockhead, was admitted March 13th, 1872. She had smallpox twelve months ago, and she has not been well since. Three months ago a pustular eruption came out all over her, especially on her shoulders and knees. Since then the sores have been healing up and breaking out again. She had no sore throat. She has had no vaginal discharge.

On admission.—The thighs, knees, and legs on both flexor and extensor surfaces are covered with large sores which have thick ecthymatous crusts on them. They all have a reddened base and are painful if touched. The skin around each is livid and desquamating.

March 14th.—Potassii Iodidi gr. x, ex Aquæ ℥j, ter die.

21st.—Potass. Iodidi ℈j, ex Aquâ, ter die. The surfaces are fast healing, and the crusts drying off under treatment.

April 12th.—Nearly well; medicine continued.

26th.—She leaves the hospital to-day. One or two crusts still remain, otherwise she is well.

The two foregoing cases are noticed on account of the comparatively early age at which a severe form of secondary syphilis displayed itself,—in one at seventeen, and in the other at nineteen years of age. One is generally in the habit of ascribing the ecthymatous form of eruption to cachexia, hard living, &c., or to the results of syphilis long contracted: whereas, in these patients, it is scarcely possible that the latter cause had been at work; and it is especially impossible to assume that these diseases could have been the results of any inherited taint. So far as my observation goes, such taint is only manifested in the offspring in adult life or after the age of puberty, as one of the severe kinds of tertiary disease, and not by a skin eruption. In neither of the cases was there a history of primary sore; but neither case, notwithstanding, could possibly have been mistaken for a disease unconnected with syphilitic taint.

Of the more remote or tertiary effects of syphilis on the skin are eleven cases. In eight the lower extremities have been attacked, in one the palate and nostrils, and in two the forearm. They have all presented the usual ulcerations of cellular membranous aspect, and have all got well by iodide of potassium, in doses ranging from ten to sixty grains, administered three times a day. It is difficult to ascertain how long patients may expect to be free from symptoms when relieved in this way. From the cases one has seen it appears that such patients go about from hospital to hospital, either as in- or out-patients, until at last they get admitted into a physician's ward suffering from some severe visceral mischief, and death sends them to the post-mortem room with syphilis of lung, liver, or kidney, and with numerous scars about the body, evidencing how much they have suffered externally. It becomes, then, a grave question whether the effects of mercury should not be more thoroughly tested before these patients are discharged as cured because their sores are healed; though the patients being apparently well are not

much disposed to carry out any further plan of treatment; but it is doubtful whether it should be applied when the patient shows evidence of great cachexia by the implication of internal organs.

CASE 4.—*Stricture of the Rectum (syphilitic).*

Mary Anne W—, æt. 29, married, was admitted February 2nd, 1872. She has had one child stillborn. No miscarriages. She has had a rash over her body and sore throat and various sequelæ of syphilis. Three years ago she noticed "tightness" in passing her motions. She was then in the hospital under Mr. Hilton for a stricture of the lower bowel. Bougies were passed, and she left, passing a very fair-sized motion. At first she was in the habit of passing a bougie for herself; but this she afterwards neglected to do, and the canal contracted again. She was readmitted to Guy's under Mr. Poland, in 1870, and again bougies were passed, and she has passed one occasionally since. The motions now are the size of her little finger. She has had much aching lately, especially when walking, and she has had profuse purulent discharge from the rectum.

An examination of the bowel by the finger shows that two inches up the gut there is a tight annular constriction, which only admits of the introduction of the index finger tip.

She was ordered Liq. Hydrarg. Perchlor. ʒj, Aq. ad ℥j, t. d., and a bougie was to be passed.

No. 2 rectal bougie was accordingly used daily from the 15th to the 29th of January. On the latter date a No. 5 passed, and this was repeated daily till she left the hospital on February 2nd.

CASE 5.—*Stricture of the Rectum (syphilitic).*

Jane B—, æt. 40, a widow, was admitted April 5th, 1872. Has had four children and four miscarriages. Has never had much rheumatic pain, though she has had rheumatic fever.

Three years ago an eruption came over her face, and continued sore for fifteen months.

She has occasionally for some time lost blood by the bowel,

and had pain. For the last three weeks all these symptoms have been intensified, and she has lost a large quantity of blood when the bowels have acted.

She has lived badly, and is in the habit of taking spirits, but not to excess.

On admission.—The face is scarred thickly over with white, depressed, irregular cicatrices, somewhat like smallpox pittings, and the relic, according to her description, of a tubercular eruption. A few recent spots are to be seen on her neck, with thick ecthymatous crusts upon them. The tongue looks healthy, and no cicatricial tissue exists about the hard palate.

A few external piles are to be seen round the anus; and within the external sphincter, at the posterior part of the rectum, extending upwards for perhaps an inch, is an ulcer three quarters of an inch in circumference, with sharply cut edges raised above the floor of the ulcer. The granulating surface is very vascular and bleeds easily, and some thick mucoid discharge issues from the bowel.

April 8th.—Chloroform was given, and a speculum passed for fuller examination of the ulcer. A bistoury was then passed along the floor of the ulcer and the external sphincter, and both divided for a line or two in depth.

12th.—Somewhat tender with a good deal of purulent discharge.

22nd.—Still a good deal of pain when the bowels act, and a little blood passed yesterday. To take Potassii Iodidi ℈j ex Aquæ ℥j, ter die.

25th.—Discharge less, and anus looking more healthy since the commencement of the iodide. To apply Lotio Nigra to the part.

May 1st.—The patient has left the hospital. External parts about the anus healthy. No pain now felt when the bowels act.

CASE 6.—*Stricture of the Rectum (syphilitic).*

Amelia B—, æt. 27, a dyer's shopwoman. The patient is subject to a winter cough, and has had hæmoptysis. She is unmarried, and no history could be elicited of any syphilitic symptoms, though her manner gave an impression very pre-

judicial to her character. She is quite regular, but has leucorrhœa much. For some years past has had a discharge from the anus, with blood in her motions at times. She has been treated at other hospitals without relief.

When admitted she had, about one inch and a half up the bowel, a constriction, imperfectly annular, and easily admitting the first finger. Some bloody mucus came away on the finger. Pain was complained of excessively. A large, soft, ill-defined swelling could be felt on the posterior wall of the bowel above the stricture.

She was ordered Potassii Iodidi gr. xx, ex Aquæ ℥j, t. d.; fish, wine ℥vj.

August 5th.—The swelling has almost disappeared from the hinder part of the bowel. She has a good deal of abdominal pain on the left side. The rectum discharges freely.

19th.—Discharge still copious. She has a good deal of pain in the abdomen with tympanitis. Temp. 101·5°, pulse 104.

September 3rd.—Rectum re-examined under chloroform. A cord-like stricture can still be felt round the bowel, the left side of which is ulcerated extensively below the stricture. So much pus comes away that it seems more than probable that some pelvic abscess has communicated with the bowel. The uterus is retroflected and fixed by adhesions.

She was now transferred to the care of my colleague, Dr. Phillips.

Case 7.—*Syphilitic Laryngitis.*

John D—, æt. 36, a plasterer, living at Lewisham, was admitted May 4th, 1872. He gives a history of a sore on the penis fifteen years ago, accompanied by a bubo, which was opened. He has had no eruption, and he says no sore throat. So much for the history which these patients give. His wife is healthy, and has had seven healthy children, though three are since dead. She has had one miscarriage.

Six or seven years ago hoarseness of voice attacked him, and within a short time some respiratory impediment. He was under my care for a long time, and was treated with large doses

of iodide of potassium, as well as with mercurials. These did him no good, and ultimately tracheotomy was performed. He wore the tube constantly for a year and nine months, when it was taken out, and the opening soon contracted greatly. It has never completely healed, and he can still force air through it during expiration, though he cannot inhale any. His voice has been perfect. Two months ago, while working in some gas-tar vapour, he felt the air irritating his throat and causing difficulty of breathing. His voice has been gradually getting more husky and his breathing worse since that time.

On admission.—There is a prolonged and impeded inspiratory effort, with considerable noise as the air passes through the rima. His voice is very husky. The air enters both lungs equally. No lividity of features. Heart sounds healthy.

On examining the mouth the posterior half of the arch of the hard and the soft palate bear traces of recent ulceration. The soft palate is, in addition, hard and adherent to the sides of the fauces.

The epiglottis is thickened, with irregular edges and some loss of substance.

The right testicle is enlarged, and has some hard substance in its body.

He was ordered Potassii Iodidi ʒss, Aquæ ad ℥j, ter die; and he was kept in bed. Under this treatment the respiration became quite quiet and unimpeded, but the voice did not improve much.

He left the hospital on the 27th, still taking the medicine, without any trouble with his breathing, but with the voice still very gruff.

Case 8.—*Syphilitic Ostitis of lower End of Humerus, &c.*

Mickie M—, æt. 33, a labourer, was admitted July 26th, 1872. Has had penile sores more than once. Three years ago a sore was followed by bad throat and eruption on the body.

He had enjoyed pretty good health till last winter, when he had a good deal of rheumatism in the left elbow. This pain has been getting much worse, and for three months has been very bad in the shoulder and fingers; it is especially severe at night.

On admission.—He complains much of this pain in the hand and fingers, elbow and wrist. Motion at the shoulder-joint is much impaired, and he is unable to raise the arm from the trunk beyond an angle of 45°. The elbow movements are good.

The lower third of the humerus is thickened and painful on pressure ; here also is a constant aching. The skin over the bone is not implicated ; no heat of the part ; other bones normal.

Acting upon the history he was ordered half a drachm of the Iodide of Potassium in water three times daily, and this was continued till he left the hospital, on August 21st, with the thickening of bone much diminished and the pain much better.

Case 9.—*Chronic Ulcers of Legs ; Severe Iodism.*

George H—, æt. 43, a stableman, was admitted on July 31st, 1872. Has had ulcers on both legs more than once ; he has also had a large sore on the right arm. Many years ago he had gonorrhœa, but no sore. He had an eruption on the body, sore throat, and bad legs.

On admission.—He has a large irregular ulceration occupying the front and inner aspect of the right leg. It has an irregular crescentic border, thick edges, and sloughy surface ; discharge thick and offensive. He has also old sores on the other leg.

It was thought that the sore was greatly due to bad viscera rather than to any syphilitic disease, and he was therefore simply kept in bed, the limb being raised. He did not progress rapidly, and, on August 19th, he was ordered Potassii Iodidi ℈j, ex Infus. Gentianæ ℥j, t. d.

The first dose was taken in the morning of August 20th, the second dose at 2 p.m. After the first, within half an hour he began to sneeze very much, and so continued to do till the second dose, after taking which his eyes began to water, his head to ache terribly, and his throat to become very sore.

August 21st.—Eyelids swollen so as to close the eyes, there is a thick purulent discharge from the conjunctiva. The skin of nose is red, with purulent patches upon it ; the mucous membrane discharging watery fluid to a large extent. Throat

sore, fauces rather injected. Voice, only a hoarse whisper. Much pain in all the limbs. Temp. 97·5°. P. 96.

22nd.—P. 96. Skin cool. Leg healing up fast. Still hoarse as yesterday, and throat is sore when he swallows. Eyes and nose still in the same condition.

On the 24th he was nearly well.

Of the above cases three deserve notice from the locality of the disease in the rectum, as stricture, by no means uncommon, and often mistaken for carcinoma of that gut; a diagnosis seriously affecting the comfort of the patient and very often leading the surgeon to an ill-judged opinion. I am bound to admit that the antisyphilitic remedy, Iodide of Potassium, does not in many of these cases seem to act quite so efficaciously as in affections of the areolar tissue under the skin: and when once the surface of the rectum is ulcerated, very considerable time elapses before the surface heals, owing I presume to the constant contact of the irritating fæces. I have watched patients afflicted with this disease for years; the longest period that I can recollect was one of 17 years. The dilatation by bougies I have frequently adopted; it was, however, only used in one of these three cases. The seat of the constriction is usually not so high up as in ordinary cancer; the history to be obtained from the patients is, as in other manifestations of syphilis, vague and unsatisfactory.

The case of syphilitic laryngitis is one of great interest, as the patient has been under my observation for a period of seven years, though not for any remedial measures, as he has been perfectly well for some time. Previous to tracheotomy, seven years ago, he had a very good tenor voice, which, of course, he lost whilst wearing the tube, but he told me that his singing voice had returned nearly as perfectly as ever. I almost feared that a second operation would be necessary, but he applied for relief in this instance earlier than on the previous occasion, and the large doses of Iodide of Potassium saved him, I believe, from a repetition of tracheotomy.

Case 9 I have placed separately, because it is the only instance that I have seen for some years of severe iodism following the exhibition of Iodide of Potassium, and, certainly, the remedy caused the most intense symptoms about the throat, nose, and

eyelids, that could be conceived. The dose ordered was ℈j, and he only took two doses. The patient at first presented the appearance of one suffering from erysipelas, but the skin was somewhat wanting in the usual redness, and his temperature remained below normal.

Case 10.—*Carcinoma of the Breast; Excision; Carbolic dressing; Death.*

Jane T—, æt. 65, a milliner from the Borough, admitted on February 7th, 1872; has noticed a small hole in her right breast for three or four years. No discharge came from this, neither had she any pain, till September last, when on washing it, blood came. It has bled little or much ever since, and a lump, gradually enlarging, has been noticed.

General health good; accustomed to the use of stimulants; has pain down the arm. She is married; has had six children, the youngest being twenty-four years of age. The catamenia ceased twenty years ago. No history of tumour on either side.

On admission.—She looks a fairly healthy old woman, of rather stout habit. Urine not albuminous.

The right breast is larger and harder generally than the left, but only at one spot in the axillary lobe is there any distinct tumour. Halfway between the breast and axilla is a transverse fissure, caused by puckering in of the skin for an inch and a half, at the bottom of which chink is a small aperture the size of a small pea, with everted edge, and exuding a small quantity of rather offensive sanguineous discharge. There is a good deal of thickening beneath the spot, and the skin is adherent to the deeper structures. The thickening cannot be defined towards the breast as distinct from the nodular lobulated feel of the gland itself. The thickening is carried up into the axilla as a general enlargement, not as any isolated glandular swelling.

February 13th.—The whole of the diseased breast was removed by incisions five or six inches long. The vessels were secured by torsion. The whole proceeding was conducted carbolically. The parts removed consisted of epithelial and rounded cells, with much young fibre tissue interspersed among them as septa. The growth was degenerating in many minute points, indicated

microscopically by a fatty and granular condition of the cells. Part of the muscle was adherent to the mass, but did not seem to be diseased.

1st day, 14th.—Temperature 98·8°; pulse 104, very small, and irregular. Has suffered intense pain all the night, not so much in the breast itself as down the arm and fingers. Hydrochlorate of Morphia gr. $\frac{1}{3}$, injected subcutaneously at night.

2nd day, 15th.—Morning temperature 102·4°; pulse 96, still irregular; tongue dry; very thirsty.

3rd day, 16th.—Aspect of the patient is ominous; she is yellow and flushed. She is apparently suffering severely. Temperature 102·2°; pulse 112, stronger and more regular; tongue quite dry. The wound dressed to-day; the axillary half is gaping, sloughing, and offensive. Sherry ℥vj.

4th day, 17th.—Temperature 100·4°; pulse 120, exceedingly irregular; no bruit to be heard. Has taken very little nourishment, but has taken her stimulants. Brandy ℥x.

5th day, 18th.—Morning temperature 97°; pulse 112, regular, but very splashing; skin clammy; tongue dry. Wound dressed to-day; still sloughing and offensive.

6th day, 19th.—Morning temperature 95·2° in axilla; pulse 96, regular; delirium; wound very offensive. Carbolic dressings discontinued, and a poultice applied.

7th day, 20th.—Death this morning.

At the post-mortem the wound was found to be in a sloughing condition, close down upon the pleura, acute inflammation of which had been excited, the sac containing a good deal of fluid, and the lung consequently being compressed and airless. No evidence of pyæmia. The viscera were fairly healthy.

Case 11.—*Scirrhus of the Breast (right); Amputation; Carbolic dressing; Recovery.*

Margaret M—, æt. 53, married, admitted October 24th, 1871. No history of tumour in the family. Had syphilis twenty-one years ago. She has had four children; her first was suckled for two years with both breasts; the other three were born dead.

A month ago she first noticed sharp shooting pains in the right breast. This caused her to examine the gland, and she found a lump there.

On admission.—She has an anæmic, worn look. The right breast contains a tumour, situated a little below, and to the outer side of the nipple. It measures two and a half by two inches, is hard, but movable. The skin is not involved, neither is it discoloured. There is no glandular enlargement. Very slight dimpling of the skin: the breast is much atrophied.

November 1st.—Chloroform given, and the breast removed by elliptical incisions along the edge of the pectoralis major, which included the nipple. Some indurated fat was with some trouble dissected away from the skin in the axilla. Very little bleeding occurred, and what did was arrested by torsion. The incisions were made under carbolic spray, and the wound closed by strapping and protective, and covered with gauze.

Chloroform was given at 3.15; she was insensible at 3.22; operation over at 3.40.

The growth removed was a small hard nodule in the axillary lobe, close to and above the nipple, not more than an inch in diameter, with white spots of degeneration and seams of fibrous tissue running through it. A concave surface was left on cutting it. The fat, which was with difficulty cleared away at the operation, when cut into was made up of a growth internally exactly like that in the breast tumour itself.

2nd.—M. T. 103·2°; E. T. 101·1°; P. 114. Tongue moist.

3rd.—M. T. 101·2°; P. 106; E. T. 100·6°; P. 108. Breast dressed.

4th.—M. T. 99·4°; P. 96; E. T. 102·2°; P. 110.

5th.—M. T. 100·6°; P. 102. Breast dressed; discharge sanguineous.

6th.—M. T. 100·2°; P. 100; E. T. 100·6°; P. 96. Breast has discharged a good deal; incision looks like uniting entirely; dressed; discharge little, thin, serous, and not offensive. Carbolised again as before.

7th.—M. T. 100·2°; P. 96; E. T. 100·8°; P. 100. Dressed again; discharge slight.

8th.—M. T. 98·8°; P. 88; E. T. 101°; P. 98. Still much pain; wound dressed.

9th.—M. T. 98·8°; E. T. 101·2°; P. 92. Wound dressed; only the lower third has permanently united; discharge a little offensive.

10th.—M. T. 99·6°; P. 80; E. T. 100°; P. 90.

11th.—M. T. 97·6°; P. 80. Much better; pain less; dressed to-day.

13th.—Wound dressed carbolically, as usual; a little slightly offensive pus on the dressings; edge of wound granulating up nicely; appetite better.

15th.—Breast dressed; very little discharge, and that not offensive.

17th.—Wound dressed; a good deal of discharge.

20th.—Wound healing nicely. As she lives close by, she is going home.

22nd.—The wound is nearly healed; a small quantity of discharge from the upper part.

Case 12.—*Scirrhus of the left Breast; quickly growing; mixed implication of skin; no operation.*

Eliza G—, æt. 42, admitted November 23rd, 1871. No history of any tumour in the family. She is married, without any family; catamenia regular. Has never had any severe illness, and seems now in fair health, but looks anxious. Five months ago she noticed a swelling in her left breast, above and to the axillary side of the nipple. Since that time it has been enlarging rapidly, and has given her much pain. She complains of a general soreness, with occasional exacerbations of sharp shooting pains. No moisture nor discharge of any kind has come from the nipple.

On admission.—She has a large tumour occupying the left pectoral region. It is uniform on its surface and flattened out, the nipple being rather depressed than prominent; the axillary lobe is the most bulging. The whole growth measures eight inches vertically, extending from over the second rib, and transversely from mid sternum to the side of the thorax eight and a half inches. The skin is adherent to the surface for two or three inches round the nipple. The tumour moves on the subjacent tissues, but there is some adhesion to them apparently. The most prominent spot is rather tender. A thickened ridge can be felt running up under the border of the pectoralis major, and one gland at the axillary end of this can be made out enlarged. The patient left the hospital without treatment.

Case 13.—*Cancer of the Breast; Excision; Recovery.*

Harriet B—, æt. 54, married, with seven children, the last confinement being twelve years ago. The menses ceased seven years since. No history of tumour in the family; there is history of phthisis on the mother's side.

In January of the present year she noticed a small lump in the right breast which has gradually increased. She has wasted lately.

On admission.—She looks thin but fairly well, both breasts being small. In the lower part of the right mamma is a hard irregular nodule, four inches in diameter. It is unadherent to the skin or to the deeper parts. No glandular enlargement. No retraction or implication of nipple; left breast normal.

August 26th.—The nodule was removed with a margin of surrounding tissue; the nipple was left, the wound being brought together by silk sutures. She suffered after the operation a good deal of constitutional disturbance, the temperature remaining over 102° for four or five days. She, however, progressed pretty well. On September 9th she got up, and left the hospital on the 10th, the wound being not quite healed.

Case 14.—*Small Scirrhous Tumours in an Atrophied Breast.*

Hannah H—, æt. 36, unmarried, and quite regular, noticed three and a half years ago a small lump above the left breast; this has slowly increased in size, accompanied by pain. During the last ten weeks several other lumps have come at various places about the skin of the breast. No history of tumour in the family.

On admission.—The left breast is very small with a retracted nipple. At various places about the breast are small (six or eight) tubercles, the two largest being about half an inch in circumference, the others very small. The two larger ones are closely adherent to the rib and intercostal muscle beneath; the smaller ones are small, round, and hard tubercles entirely confined to the skin. An enlarged and tender gland is to be felt in the axilla, deeply situated.

The patient left the hospital four days after admission.

Case 15.—*Large Breast Tumour* (*Fibroma*). *Removal; Death.*

Maria C—, æt. 58, married, with nine children, of whom the youngest is eleven years old, was admitted March 6th, 1872. Her health has never been good. No history of tumour in her family.

For two years and a quarter has noticed a gradually enlarging growth in the right breast, associated with but little pain. Both nipples have always been retracted, consequently she has suckled her children very little with either breast.

On admission.—The patient has a sallow aspect, with slight œdema of the conjunctiva; pulse quiet, 80.

The right breast is occupied by a large rounded mass distending the skin and giving it rather a livid appearance. The skin is also somewhat adherent to the tumour which seems, however, quite movable on the subjacent part; it is elastic in place, and on firm pressure is nodulated. The nipple is retracted, axillary glands not enlarged; measurement of breast at greatest circumference thirteen inches.

The left gland is atrophied but healthy. Urine, sp. gr. 1020; no albumen. There is a copious deposit of lithates.

She was ordered Tr. Ferri Perchlor. ♏xv, ex Infusi Calumbæ ℥j, t. d., and full diet.

On the 19th the breast was removed, much of the skin covering the growth was saved and ample left to cover in the wound. The vessels were twisted, and the edges of the skin incision were adjusted by strapping; no sutures were used.

It will be unnecessary to give the further daily details of the case; suffice it to say that the temperature rose the day after the operation to 104°, and that it remained high for five days, after which it gradually subsided to nearly normal, that the wound remained from first to last without the slightest attempt at reparative action on its glazed surface; the skin sloughed; the discharge, what little there was, becoming very offensive; the parts around and down the arm becoming infiltrated with sero-purulent fluid; and ultimately she had empyema and cystitis. Death took place on the 37th day after the operation.

At the post-mortem, except the empyema at the base of the left lung and a very intense looking cystitis, the organs were all healthy. The kidneys, though they gave no albumen

to the urine during life, might perhaps have been challenged, since the capsules were adherent, the surfaces slightly granular and one or two cysts to be seen. No secondary growths were found in any organs.

Description of the tumour removed.—A section through the mass shows a firm lobulated rather translucent surface with very much the aspect of medullary cancer. Its centre is of an opaque yellow colour; when scraped the whole growth is found to be much more resistent than it looks, and it gives off but little fluid, which is slightly turbid. At one end of the specimen, tucked in between two large solid lobules, are a number of rounded bud-like processes such as are so frequently met with in cystic diseases of the breast. When examined microscopically, in water, corpuscles of various shapes were seen in a somewhat delicate hyaline stroma. Though varying in size and shape most of these bodies adhered, more or less, to the spindle cell type. Only a few of them contained a nucleus, and the majority had the appearance of solid colloidal bodies which in some cases were granular and had oil globules in them; some had long and delicate processes at either end, while many more wanted these or gave place to sound nuclei of large size. The stroma in which all the cellular elements were embedded was composed of hyaline fibres which did not become isolated or resolved into anything more definite even after a rather prolonged pencilling. The yellow central part had all the appearance of the more succulent *plus* a large increase of fatty matter. On the whole the tumour had more the resemblance to young fibrous tissue than to anything else, though when perfectly fresh it merged on the one side into the myxoma group, on the other into the spindle-celled sarcomata.

Case 16.—*Myxoma of the Breast* (*Periangeioma*). *Removal.*

Anne G—, æt. 57, a laundress from East Greenwich, admitted March 12th, 1872. Married but without any family, never having been pregnant, enjoyed very good health till four years and a half ago when she first noticed a small lump in the right breast, on the axillary side of the gland. The lump increased very slowly till four months ago, and at that date was no larger than an egg. During the last two months, how-

ever, the growth has been alarmingly rapid associated with excruciating pain, her rest at night being reduced to a minimum. No history of tumour in the family, and no blow or other injury is known to have been received prior to the first appearance of the disease. Habits temperate.

On admission.—She has the aspect of a strong and healthy woman. The right breast is occupied, more especially the upper and axillary lobes, by a large growth measuring twelve by eleven inches. It is evenly rounded except at the upper part where are two distinct smaller bosses, one projecting towards the axilla, the other towards the sternum. The skin over the growth is much stretched and livid from a minute injection of the smaller venules. It is so tense that whether it is in a state of extreme tension alone or whether it is invaded by disease cannot be decidedly ascertained. There does, however, seem to be some motion of the skin over the deeper part where the breast is more flaccid below, and here something of the normal feel of mammary gland is obtained by palpation. The nipple is flattened out but not retracted. The whole mass moves freely on the subjacent muscle, but the slightest touch causes such extreme pain as to forbid a careful examination. The pectoralis as it passes to the axilla is rigid, but no distinct glandular enlargement can be felt. The left breast is healthy.

For four days prior to the operation she was only kept very transiently at rest by hypodermic morphia injections.

March 19.—Chloroform was administered and the growth removed; much of the skin over it was saved by dissecting it off the tumour; some muscle fibres were divided beneath the tumour; the vessels were all twisted and the edges of the wound were adjusted by strapping. Carbolic dressing not used.

The growth, which is described minutely in the 'Transactions of the Pathological Society of London,' need not be described again here, suffice it to say that the tissue was that of a myxoma, and the arrangement of that tissue in some parts was one of new growth around the vessel, and from this it has been named "periangeioma."

The temperature, which was 103·2° the morning after the operation, gradually declined and by the 6th day was normal.

On April 18th, two pieces of cuticle were grafted to the centre of the sore. These, however, entirely disappeared, though sub-

sequently on May 6th an island of epidermis appeared about the spot on which one of the grafts had been placed.

The sore gradually contracted and she left the hospital, on May 21st, with a sore one inch by one and a half in dimension. General health good. Some stiffness in the arm is caused by dragging on the cicatrix when the pectoral is stretched.

The patient was re-admitted, on June 20th, with a nodulated sprouting soft mass situated partly in the cicatrix and partly below it. She states that three days after leaving the hospital she noticed a lump which has gradually increased. No definite glandular enlargement can be made out, but the pectoral fold has an œdematous feel about it, and there is much superficial thickening of the integument all round the mass. The parts are all firmly adherent to the ribs.

June 22nd.—Nitric acid was applied to the skin round the growth, and chloride of zinc to the growth itself. By this means it was hoped to cause some destruction of the tissues and decrease of the mass. The process caused so much pain, however, that the woman begged that it might not be repeated, under these circumstances she was treated only by palliatives; chloral and opium were given largely to relieve the pain, but without very much effect. She gradually sank into a comatose condition and died on July 17th.

At the post-mortem the tumour was closely adherent to the ribs and intercostal muscles. The pleura was adherent beneath, but there was no extension of the disease through into the chest. The axillary glands were not affected, though the growth extended well into the axilla by means of tough fibrous-looking tissue. No secondary growth was found anywhere.

Concerning these tumours of the breast I must refer my readers to the reports. They were seven in number; of these five were cancerous, one a large fibroma, the other a myxoma. Two were not operated upon, Case 12 from its large size and implication of skin and axilla, Case 13 because of the close adhesion of the growth to the chest wall.

In Case 11, during the time that the breast was dressed antiseptically, there was a decided elevation of temperature, which did not acquire its normal standard for more than a week after the operation.

Of the three patients who died two did not leave the hospital; the other, though leaving well, returned within a month.

Case 17.—*Cancer of Submucous Glands of Upper Lip.*

Richard J—, æt. 67, a plasterer, was admitted March 6th, 1872. Is a smoker, holding his pipe on either side of his mouth. Three years ago he noticed a lump on the right of the median line on the upper lip, which came after a blow. This never subsided, though it remained stationary till three months ago, when it suddenly began to enlarge. No history of tumour in his family.

On admission.—He has a nodulated swelling protruding forwards at the right angle of the mouth on the upper lip. It is hard, and the surface is covered by a dry crust. There is no discharge from it of any kind. Extensive thickening exists around, between the skin and mucous membrane, upwards to halfway between the lip and margin of the lower eyelid, outwards to beyond the angle of the mouth and across the median line for three-quarters of an inch. Some small glands can be felt beneath the lower jaw on both sides.

March 8th.—I removed the growth by a wide sweep into the right cheek and across the median line of the lip. The parts came together without much difficulty, a pin being inserted at the lower part, and sutures above this.

The mass removed was a rapid growth of gland tissue, composed largely of embryo cells arranged in an acinous form. The epithelium of the lip was comparatively unaltered, though the deeper layers of the skin were invaded by the disease.

The parts united at once, the sutures were removed on the fourth day, and he left the hospital on the thirteenth day after the operation.

April 15th.—The patient came to the ward to-day. The parts all look healthy, and he has a very good upper lip. No sign of return of disease as yet.

Case 18.—*Ulcer near Anus; Epithelioma (?)*

John M—, æt. 40, a labourer, admitted July 25th, 1872. Married. Had gonorrhœa many years ago. His wife has

never been pregnant. Has enjoyed good health till within the last three months. Latterly he has had severe cough and emaciation. No hæmoptysis.

For twelve months has suffered from piles; at first internal only, but lately external; and he has had a sore for some time past. Has lost very little blood, but the sore has discharged freely.

On admission.—The patient is a well-made man, but pallid, and with clear sclerotic.

Chest.—Dulness at the left infra-clavicular region, with constant clicking crepitation. Respiration deficient, with prolonged and bronchial expiration, and increase of vocal resonance. Fibroid condition of apex with small pea-sized cavities. The right apex is not above suspicion.

Condition of anus.—In front of the anal aperture is a round sore, with irregular granulating floor, and thickened but rather clearly defined edges. It is about an inch in diameter. Discharge thick and purulent. There is no communication with the bowel, though its posterior edge is close to the gut. No piles external or internal present. A microscopical examination of a small piece from the margin of the sore shows only granulation tissue.

July 29th.—Chloroform given, and nitric acid applied to the surface of the ulcer; solid nitrate of silver being afterwards applied to the surface.

Aug. 1st.—The slough has cleaned from the surface of the sore, which looks much in the same condition as on admission. Lotio Nigra applied.

9th.—Nitric acid applied again.

Sept. 10th.—He left the hospital with no improvement whatever in the ulcer.

Case 19.—*Tumour in the Abdominal Wall.*

Louisa R—, æt. 24, married five years. Had one child four years ago, and was ill for three months after with inflammation in the stomach and vaginal discharge. Three years ago she had rheumatic fever.

Three months after her confinement she noticed a small lump in the abdomen below the rib on the left side. This gave her

pain when she walked or over exerted herself, and has gradually enlarged since. It is at no time smaller than it is now.

On admission.—The left hypochondriac and epigastric regions are occupied by a globular swelling five inches in diameter. It is apparently in the abdominal wall, being movable on the deeper part. It is very tense, and no fluctuation can be elicited. When the patient coughs the abdominal muscles become very tense over it, and all the tumour is thus lost. Skin normal and freely movable over the tumour, while the abdominal walls are so lax that it is possible to get very much behind the tumour and isolate it in the hand. Very little pain.

June 1st.—Chloroform was administered and the swelling punctured with a fine trocar. Before, however, this was done, it became quite certain that the mass was solid throughout, and, as was expected, nothing came away; a small piece of the mass was found in the groove of the trocar, which on microscopic examination was found to consist entirely of oval nuclei and fine tissue. A little striated muscle was also brought away. With these facts at our disposal for diagnosis, I thought it most probable that the tumour was one of a fibrous nature in the abdominal wall, possibly growing from the transversalis fascia, but it was still possible that it might be a syphilitic deposit, though there was no evidence that the patient had ever suffered from that disease. However, to give her the benefit of the doubt, I ordered her Potassii Iodidi ℈ij, ex Aquâ, ter die, and Ung. Hydrargyri was applied on lint to the surface of the abdominal wall over the tumour. This was continued for a fortnight and then discontinued.

As to operative measures, I did not deem any expedient at the present time, seeing that the tumour was not of an inconvenient size, or at present in any way detrimental to health; while its removal might possibly have been attended with immoderate and serious risk to life.

The patient was, under these circumstances, discharged and told to come up in two months' time, or, should she be troubled, at any time.

Case 20.—*Tumour in the Neck.*

Frederick C—, æt. 38, a whitesmith, admitted on July 24th 1872, had always been very healthy till ten weeks before admission when he noticed a lump on the left side of his neck, the size of a walnut. This increased rapidly till a fortnight ago, but has not increased since. He thinks also that it is now less hard than it was. No family history of cancer. He has lived temperately.

On admission.—He looks fairly healthy. On the left side of his neck is an oval tumour, situated obliquely under the sterno-mastoid, the fibres of which are tense below and can be felt above, but are lost over the tumour. The growth measures five by three and a half inches, is very hard except at its lower part where there is fluctuation. The skin is not implicated, but there appears to be deep adhesion to the tissues beneath the tumour. With the head placed directly forwards, the mass comes up to the trachea from the sterno-mastoid region, but does not in any way distort it, neither has he any difficulty in swallowing or breathing. No enlargement of other glands. Heart sounds normal; chest normal.

I recommended excision of the tumour if he wished anything done, but at the same time looked upon the operation as a serious one. He, however, was only willing that it should be dispersed by medicines, and left the hospital on that account.

As to its nature we can, therefore, only conjecture that probably it was a growth of lymphatic gland structure (lymphadenoma) or possibly a connective tissue growth or sarcoma—one of its various forms.

Case 21.—*Large Subcutaneous Nævus in left Breast.*

Emma J—, æt. 3, was admitted February 26th, 1872. The mother has noticed an enlargement of the left breast since birth.

On admission.—The left breast is much larger than the right with a somewhat retracted nipple. The parts are everywhere soft and flaccid except at two places—one in the axillary lobe, the other to the right of the nipple. Here two almond-shaped

solid tumours are felt, moving freely beneath on the subjacent tissues but adherent to the skin. The surface of the axillary tumour is discoloured with a few small distended capillaries running over it. The breast does not diminish in size on pressure, and the child is so good-tempered that it will not cry.

March 4th.—Mr. Birkett saw the case with me. The child was made to cry to-day, and, perhaps, the tumour became slightly larger. The sensation communicated to the hand, though not very palpably so, is that of a large nævus.

On the whole, as the two solid masses indicated spontaneous cure, at any rate in some parts of the tumour, I judged it inadvisable to attempt any operative measures at present, and the child therefore was taken home.

Case 22.—*Sebaceous Cyst in Lumbar Region; Obscure Spinal Symptoms after leaving the hospital.*

John D—, æt. 26, a boilermaker, living at Mile End, was admitted May 29th, 1872. The man has enjoyed good general health till six years ago, when he had what was called rheumatic fever, but he had no other symptom than intense pain in the back. Three and a half years ago he first noticed a small painless lump in the lower part of his back, which has gradually enlarged. He has sometimes, after working some hours, felt a pain in his back, but he has not been incapacitated for work. He has lived steadily, and never had venereal disease.

On admission.—At the lower part of the back, over the lumbar spines, rather more to the right side than the left, is a tense fluctuating swelling, six and a half by six inches. In some places a dimpling of the skin can be seen, giving a lobulated fat-like appearance to the mass. There is no spinal tenderness nor distortion; no impulse in the tumour on coughing. The integument is reddened at one spot, as if some ulceration would soon occur. He had only been in the hospital two days when the swelling opened and discharged a quantity of thin pus and sebaceous material. The opening was enlarged for an inch and a half, and as much as possible of the sebaceous contents squeezed out. No cyst could be taken away.

He left the hospital on June 7th, with the cyst still discharging, but gradually contracting.

On June 15th he returned with this history:—That after leaving the hospital he remained quite well for four days, when at 4 a.m. he felt pain in his back, and weakness and numbness in the right leg, extending, within an hour, to the left leg. He had hardly any power to move them, and was quite unable to walk. He had no urinary nor rectal trouble. He himself attributed his pain to sexual excesses rather than to the abscess in his back.

When readmitted he had no marked symptoms. Slight numbness was said to exist over the gluteal region, but he had no paralysis, and all spinal pain soon disappeared. Nine days after his second admission a small piece of compact tissue, bone, came away from the abscess, about the size of half a pea. It was true bone, and if it came from the cyst, as he says it did, it must have become detached from a spinous process.

The patient finally left the hospital on June 26th, 1872, with the abscess nearly closed.

Case 23.—*Tetanus.*

James C—, æt. 21, a carman, was admitted on February 13th, 1872. Ten days ago he cut his left middle finger with a rusty nail. He felt quite well till two days ago, and took no heed of his finger till yesterday, when he began to be stiff about the jaws, and towards evening he could not swallow nor open his mouth. Later on during the night he was nearly strangled, the spasms being severe, and affecting his breath.

On admission.—The jaws are firmly closed, with rigidity of the masseters. The posterior cervical muscles also are rigid, the sterno-mastoids and anterior muscles, the abdominal and lumbar muscles being unaffected.

He is quite sensible, skin sweating, temp. 99·2°, pulse 96. He lies in bed quietly, with slight opisthotonic spasms now and then, which, if he is disturbed, become both more frequent and more severe.

He has a wound on the left middle finger, above the metacarpo-phalangeal flexure, a little to the right of the median line, and on the palmar surface. It is three lines in diameter, with a granulating surface, and communicating with a sinus which leads down to the bone; grumous pus exudes on pressure.

The finger was freely incised and a warm poultice applied, and he was ordered Calomel. gr. x, statim, Chloral Hydrat. ʒss, 2ndis horis.

The first dose of chloral was given at 8 p.m. The calomel he could not take; an enema, of soap and castor oil, was administered instead.

February 14th.—He still has rather strong opisthotonic spasms at intervals, regulated partly by the disturbances which he undergoes. Very slight movements induce a spasm, in which the muscles of his face are contorted, but apparently somewhat voluntarily, as an index of pain suffered; the head also becomes drawn backwards. He has had the chloral every two hours, and now swallows better than he did, though still it must be said that the act is performed with extreme difficulty, four attempts being made to dispose of half an ounce of fluid. Morn. temp. 99·8°; pulse 120.

15th.—The patient got gradually worse till 11 p.m. last night, when he was insensible, breathing chiefly by the diaphragm, and with a good deal of spasm about the glottis. He died rather suddenly at 1.30 a.m. this morning.

Post-mortem.—Organs all congested.

Case 24.—*Naso-pharyngeal Polypus.*

Thomas M—, æt. 24, a dairyman, noticed that three weeks before Christmas he was unable to blow his nose, and that all sense of smell was gone; he thought he had a bad cold. Latterly this condition has been aggravated, and he has had a discharge of matter, tinged with blood, at times from the nostrils. Three weeks ago he found a swelling in the nose.

On admission.—He has a nasal manner of talking. The right nostril is completely occluded by a gelatinous-looking growth, which presents at the anterior orifice. The posterior third of the hard palate, and most of the soft, is pushed downwards into the buccal cavity by a rounded elastic swelling, measuring one and a half inches antero-posteriorly by one third inch transversely. The mucous membrane of the palate over this is very thin, and very nearly ulcerating through. On passing the finger up behind the soft palate, the mass can be

felt as a rounded body occupying the posterior nares. Nothing more than this can be made out by the laryngoscope.

Both eyes are constantly watering from obstruction to the nasal ducts, and there is a small abscess over the lachrymal sac of the right side.

March 10th.—Considerable hæmorrhage from the nose to-day.

12th.—I removed the growth after the following manner:—An incision was made through the median line of the lip into the nostril, then through the right ala nasi to within half an inch of the inner canthus of the eye; the cheek being then reflected, the right median incisor was extracted, and the inter-maxillary bone sawn through on the right side; subsequently, the nasal process of the right superior maxillary was sawn through, and the bone turned forcibly outwards, after dividing the whole length of the hard palate by a long pair of stout bone forceps. By this means the cavity of the nose was freely exposed, and the tumour separated from its very extensive attachments to the base of the skull near the posterior nares. The growth could only be detached in pieces, and it left behind it a large cavity, which could have contained a moderate-sized hen's egg; no bleeding of any moment occurred. The maxillary bone was then replaced, and the flap of skin adjusted with sutures.

Description of the growth.—It seems intimately connected with a layer of bone, from which, however, it can be stripped pretty easily. It is confined anteriorly to the right side by the hinder and basic part of the vomer, while in various places on its right aspect are numerous thin plates of bone, apparently belonging to the turbinated.

Microscopically, the growth is of the sarcoma type. The connective tissue being, however, in small proportion, while the cell elements greatly preponderate. They are mostly oat-shaped nuclei, very finely granulated, arranged often in longitudinal rows, and thus giving the appearance of fibrous bands. The bony layer outside the growth is softened, and its corpuscles indistinct, while in many places in thin sections of it oval nuclei like those composing the tumour are seen.

1st day.—M. T. 102·4°; P. 136. Discharge glairy and offensive.

2nd day.—T. 101·6°; P. 128.

3rd day.—T. 99·8°; P. 132. Discharge offensive; edges of incision adhering well.

4th day.—T. 101·4°; P. 120. The right superior maxilla drops a little when unsupported. To obviate this a gutta percha mould was made by my dresser, Mr. Pinching, which, fitting on to the lower molars, kept the upper jaw in its proper place.

6th.—T. 101·4°; P. 108.

9th.—The superior maxilla has united to its fellow perfectly, and the mucous membrane of the hard palate also. The incision through the latter can only be recognised on a careful examination. The arch of the palate is perfect.

14th day.—Patient is up.

17th day.—He left the hospital.

27th day.—The patient came to the ward to-day. The mouth and face have soundly healed. No sense of smell, but he can blow through either nostril. A small nodule exists on the left side of the cicatrix, which looks something like a return of the growth.

April 12th.—The growth is rapidly returning. A large rounded nodule now protrudes from the roof of the mouth into the buccal cavity.

The chief point calling for note in the operation on this man was the mode of dealing with the bone.

The growth was very large, and considerable space was required for the requisite manipulation. To obtain this, the hard palate and intermaxillary bone were divided, the nasal process of the superior maxilla of the right side, after which the bone was wrenched forcibly outwards. By this means my first object was fully attained, viz., freedom of manipulation, for the whole nasal cavity was laid fully open, and with the whole bone away it would hardly have been possible to obtain more room.

The second object was, while making space to get at the growth, to leave the bone sufficiently undisturbed to allow of union with its fellow when replaced after the operation. This, I conceived, would be effected by leaving its posterior attachments untouched, save, perhaps, some slight laceration in turning the bone out of position. For this end, the soft parts

behind, and the nutrient vessels near the spheno-palatine fossa, were still left *in sitú,* to which must be attributed entirely the most favorable and speedy repair of the injury which was inflicted on the bone. The result in this case was indeed so satisfactory, that in any similar case I should not hesitate to adopt such a procedure again.

This patient was re-admitted a month afterwards with a rapid return of the growth, which was removed again, though not thoroughly, in the same manner. He again repaired rapidly, and left the hospital, the termination of the case being that he was admitted to University College Hospital.

The conclusion of this case has been kindly furnished to me by Mr. Marcus Beck.

"He was admitted under Mr. Heath's care on June 20th : he had then a large irregular mass projecting into the mouth to such an extent as partly to interfere with swallowing and somewhat with respiration. There was considerable prominence of the left eyeball, and the tumour projected into the temporal fossa above the left zygoma; on the day of admission Mr. Heath performed laryngotomy. On June 27th, Mr. Heath removed a large mass of the tumour by the galvanic écraseur cautery, this gave him but little relief, there was scarcely any bleeding during the operation, he was able to take food to the last day of his life, and he died of exhaustion on July 24th.

"*Post-mortem.*—Thoracic and abdominal viscera healthy. No secondary deposits found anywhere. On removing the brain a lobe of the tumour, almost the size of half a walnut, was found to project through the right great ala of the splenoid into the middle fossa of the skull; another projected through the floor of the sella turcica; the inner wall of the orbit was absorbed on each side, and parts of the tumour projected into it protruding the eyeball. All the sinuses communicating with the nose were filled with new growth; the outer wall of each antrum was absorbed to such an extent on the right side as to loosen part of the alveolar border of the bone; the whole hard palate was destroyed. The tumour was soft and pulpy in many parts, and of a uniform dirty yellowish-white colour. Under the microscope it was found to be not of a carcinomatous nature, but to belong to the class of so-called sarcomata."

CASE 25.—*Axillary Aneurism; Pressure on Subclavian; Cure.*

Joseph S—, æt. 36, a labourer, living at Lewisham, was admitted February 9th, 1872.

No rheumatism nor gout in the family; had syphilis ten years ago. Has always enjoyed good health till three months ago, when he had "rheumatics" in the right forearm and hand; this attack lasted nine weeks, and left his right forearm useless. He went to work for a month, and then began to experience pain in the right axilla, and for four weeks past has found a beating swelling in the axilla. The tumour is increasing in size.

On admission.—He is a dark-haired man, sallow, but fairly healthy, skin perspiring, and with a rheumatic odour.

Heart sounds thick and murmurous at the apex, while at the base is a short rough systolic murmur with a distinct but not loud regurgitant murmur.

The right forearm and hand can be perfectly flexed by the biceps, but the movements proper to the forearm—pronation and supination—are much impaired and the hand is dropped with no power of raising it up, and with inability of extending fingers or thumb which remain constantly flexed. The triceps also is completely paralysed, no power of extension of the forearm remaining.

The muscles of the entire extremity are flabby, and those of the forearm wasted. Sensation seems everywhere perfect though he complains of a general feeling of numbness.

The right axilla is occupied by a rounded swelling extending from the lower border of the clavicle downwards, pushing the pectoral muscles in front of it to an inch beyond the anterior axillary fold. Visible expansive pulsation exists over the whole tumour, which is globular in shape and about three inches in diameter. A whizzing bruit is heard from the tumour upwards to the carotid, diminishing as it goes.

Pulsation is entirely arrested by pressure on the subclavian above the clavicle, but with much pain to the patient and difficulty to the operator. It is much more easily arrested below the clavicle and without pain.

The right radial pulse is very feeble, indeed hardly to be felt, and the artery itself feels cordy. No œdema of the hand or arm is present.

The sphygmographic tracing shows a marked difference between right and left radials, but gives no indication of aortic aneurism.

The tracings taken by Mr. Mahomed are annexed:

FIG. 1.—Sphygmogram: right radial; case of J. S., æt. 36, suffering from right axillary aneurism; patient not under chloroform.

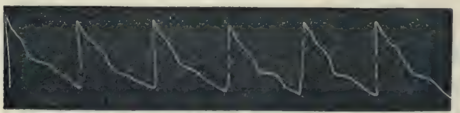


FIG. 2.—Sphygmogram: left radial; same case; patient not under chloroform.

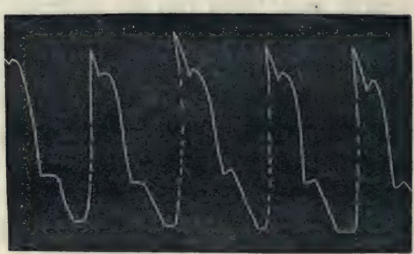


FIG. 3.—Sphygmogram: right radial; same case; patient under chloroform.

Feb. 15.—Pressure applied to the subclavian by means of the key, alternately with pressure to the axillary immediately below the clavicle. This was kept up from 12.45 till 3 p.m., during which time distal occlusion of the axillary was maintained by an ordinary band tourniquet on the arm. All pressure was discontinued at 5 p.m.

16th.—No appreciable difference in the tumour.

17th.—Pressure applied without chloroform to the artery just below the clavicle. The pain was so unbearable that it could only be maintained for half an hour, notwithstanding that only sufficient pressure to moderate the blood-flow through the vessel was applied.

18th.—Pulsation in the aneurism much less forcible.

Pressure applied under chloroform by key above the clavicle from 11.30 a.m. to 8 p.m. All pulsation had stopped in the sac at 5 p.m. (after 5½ hours pressure), but to ensure success it was kept up for three hours longer.

19th.—Pulse 92 in left radial, no pulse in right brachial or radial. No pulsation in the sac of the aneurism, but forcible pulsation is felt in the course of the axillary for two inches below the clavicle; here it suddenly ceases, and a rather large anastomosing branch can be felt to course from thence superficially over the pectoral muscle. Slight excoriation of the skin over the seat of pressure above the clavicle, with pain in this region.

26th.—The aneurismal sac is contracting. No return of pulsation as yet in either radial or ulnar arteries. Arm still very helpless. No voluntary power in the fingers.

He now went out for a fortnight, and was readmitted on March 20th, his then condition being—No impulse in the tumour, which seems quite cured. The radial and ulnar arteries are still pulseless. He has more movement in the forearm and arm, but the hand is still completely paralysed. He was now treated with Franklinic and Faradic electricity, but these did not appear to influence the muscles much. He was therefore treated by the continuous current rapidly interrupted for a short time daily, by which means a considerable power of flexion of the fingers was restored, and he became able to give a weak grasp. The extensors remained paralysed, and the hand consequently dropped, though the muscles acted well when the current was applied.

He left the hospital on May 1st to resume work.

Case 26.—*Innominate Aneurism; Distal Compression of Carotid; Death from capillary cerebral hæmorrhage, &c.*

James T—, æt. 55, a baker, was admitted April 4th, 1872. The patient was quite well fifteen months ago, when he had a sudden attack of hemiplegia on the left side. He went to bed well, and awaking during the night found his arm and leg powerless. Speech was never affected. The arm and leg have since then partially recovered, the arm better than the leg. No gout in the family. No history of aneurism in his relations.

Three months ago he first noticed a lump, the size of a small walnut, at the top of the sternum, which gave him pain in the right shoulder and up the neck and side of the head. The swelling has increased in size, and he has become very deaf in the right ear, and sight is somewhat defective in the right eye. He has never had any dyspnœa or loss of voice.

On admission.—The patient is a thickset man, with short neck; the right eyelid is a little drooping, while the right pupil is more contracted than the left, and the eyeball is more prominent. Hearing is so defective in the right ear that a watch cannot be heard ticking when in contact with the head.

On the right side of his neck extending obliquely upwards and to the right from the sternal notch for three inches is an elongated pulsatile aneurism. The pulsation in the carotids on either side does not differ much, but a sphygmographic tracing taken by Mr. Mahomed shows that while the chief dilatation lies in the carotid, there is also some obstruction to the current of blood as it enters the subclavian. This is known by the loss of percussion which exists in the radial on the right side as compared with that on the left. He has also hypertrophy of the heart with bad arteries.

An ophthalmoscopic examination does not show much difference between the two optic discs.

There is a systolic murmur extending all along the tumour and down the sternum, at the bottom of which bone it is louder than elsewhere. No change in his voice is noticeable and no dyspnœa is present. The grasp with the left hand is not quite as good as that with the right, but there is not much difference.

He was kept in bed and ordered milk diet, with vegetables and rice; no beer.

April 15th.—Chloroform given to-day, and distal pressure on the carotid kept up from 11.15 a.m. to 9 p.m. At 2 p.m. the pulsation in the sac was less forcible than at the commencement of the pressure. At 3 p.m. it was noticed that he required very little chloroform to keep him insensible, and later on only a drachm was used in an hour, when he was apparently comatose. Chloroform was discontinued at 8 p.m., pressure being kept up till 9 p.m. At 10 p.m., still comatose, respiration being very slow and difficult. His state became worse, and to all appearance at one time he was dead; artificial respiration, however,

succeeded in restoring him. Frequently, throughout the time pressure was carried on, the temporals were felt to beat, so that a very complete arrest of blood current was not maintained.

16th.—Pulse 88; still comatose. He has paralysis with rigidity of left side, but moves the right arm and leg frequently. The right pupil is more contracted than the left, but both act. Pulsation in the aneurismal sac much less forcible. Right temporal beats normally. There is paralysis of right side of face.

17th.—Temperature in axilla 100·4°; pulse 104. He continues in exactly the same state.

21st.—He has continued comatose ever since, his pulse varying from 108 to 120; temperature from 98·6° to 99·2°. Paralysis continued up to his death.

Post-mortem, April 22nd.—Brain, dura mater, and arachnoid thick; convolutions wasted with much space between them. The larger vessels at the base, viz., the basilar, posterior, middle, and anterior cerebrals and carotids were all thick, and the first mentioned contained a considerable sized atheromatous patch. No embolic plugs were found in any of the larger vessels.

The surface of the brain was studded over on its upper part, but not extending down to the base, by numerous circumscribed patches of capillary hæmorrhage with softening. Most of these were of the size of small hazel nuts, and consisted chiefly of softened gray, and its adjacent white, cerebral matter dotted over closely with punctiform hæmorrhage so as to give them a speckled appearance. The left side of the brain was more affected than the right, and the outer part of each hemisphere, not that part near the longitudinal fissure. The central parts of the brain seemed healthy. No trace of old softening or apoplexy was found.

Heart large; left ventricle tough; the aortic valves were competent. The aorta was quite calcareous, and the transverse part of the arch was converted into a large sac which involved the origin of all the great vessels at the root of the neck. The innominate was also itself aneurismal; its mouth, though wide and sacculated as it formed part of the aortic sac, was yet constricted when compared with the calibre of the trunk, which had become dilated into a fusiform aneurism of considerable size, but which had only involved the carotid at its com-

mencement to a slight extent, and the right subclavian not at all.

The sac of the aneurism was loosely filled with clot, but not so fully as to preclude the probability of a current of blood reaching the subclavian; that at the lower part of the sac was laminated and of a bright red colour, evidently of some date, while that at the upper part was black and recent. The carotid and subclavian were both pervious. The aorta contained in its channel a soft granular decolorising clot, which, though quite recent, had probably formed during the last days of life, as it was not gelatinous nor buffed on one surface as is usual with post-mortem formations.

The other organs were fairly healthy.

Case 27.—*Aneurism of Left Popliteal Artery.*

John M—, æt. 35, a labourer, was admitted October 24th, 1871. The patient is intemperate, but gives no history of syphilis.

Ten days ago felt pain in his left knee, and five days ago noticed a swelling.

On admission.—There is an aneurism in the left popliteal space, easily controlled by pressure on the femoral.

Treatment by pressure was commenced on October 27th by a weight and screw-tourniquet, applied alternately on the femoral.

Pressure was kept up at intervals under chloroform and without it, from October 27th to December 21st, by tourniquet and Reid's compressor, during which time complete arrest of the blood-current was procured for about sixty-one hours, and a partial arrest of the current for thirty-two hours. In addition flexion was kept up for some time also.

The disease was completely cured by December 26th.

This case is fully reported in the 'Transactions of the Clinical Society' for 1872.

CASE 28.—*Chronic Œdema of Leg from Venous Obstruction, simulating Elephantiasis.*

Richard W—, æt. 21, a blacksmith, living near Swindon, was admitted on August 10th, 1872. He gives a good family history. He enjoyed good health till two years ago, when he had slow fever with diarrhœa, and was ill three months (? typhoid). Towards the end of this attack the right leg became swollen and painful, the swelling extending up the thigh, while the pain was chiefly below the knee. The swelling partly, but not entirely, subsided and he went to work. Thus he continued for twelve months, the size of the limb increasing by day and diminishing at night. Twelve months ago it became painful again and opened, discharging pus. He now laid up ten months, and then again resumed work. On the whole the limb has gradually increased in size. He worked on till a fortnight ago, when the limb was so large that he could hardly get his trousers on. He has been lying up since, and the size has much diminished.

On admission.—He looks a healthy man; no cough, &c.

Right limb, surface.—The veins are clearly marked and enlarged on the inner side of the thigh, also about the knee and upper part of the leg. No varicose veins to be seen. Linear atrophy of the skin observable on the inner part of the popliteal space. The lower half of the leg, to a little way below the ankle, is enlarged, slightly discoloured, and has numerous isolated flattened tubercles upon it. One or two small cicatrices are to be seen on the inner side of the leg, but no excessive tubercular growth has taken place around them. To the hand the femoral and saphena veins near the femur feel cordy, while the other superficial veins feel ridgy; this may be due to the atrophy of skin in their course. The integument and subjacent parts over the lower three fourths of the leg are nodulated in feel, from unequal hypertrophy of the tissue affected, though the whole limb has some thickening about it. The tubercles visible on the surface are much diminished by firm pressure. Bones normal. No pain, no enlargement of the glands in the groin or abdomen; no moisture of the sur-

face. The affected calf measures in circumference two and a half inches more than that of the sound side.

The patient was kept in bed and the limb was raised on a pillow. Under this treatment it rapidly diminished in size, and seventeen days after admission very little, except the tubercles on the surface, remained to indicate the former swelling. The leg was then firmly bandaged and the patient left the hospital.

Harelip.

Four cases have been admitted, of which three were double, one of these not extending on either side into the nostril. The ages of the children were respectively four and a half months, eight months, nine months, and three years and a quarter. The three younger children all had fissures in the hard and soft palate. In the elder child both sides were operated upon at the same time; that is to say, the central inter-maxillary portion was pared on either side, and retained as a wedge-shaped piece, with its base at the columna nasi. The two other cases were each operated upon as two single harelips. All three double cases did well. An attack of croup just before one was to leave the hospital terminated fatally. The single hare-lip failed to unite, and the mother left the hospital with the child on the twelfth day, attributing the result to the less pure quality of the milk than that the child had been accustomed to. The child has since returned and has been operated upon successfully, a different milkman supplying the hospital.

CASE 29.—*Incarcerated Hernia (Inguino-Scrotal); Diseased Viscera; Death.*

Henry D—, æt. 52, a carman, admitted January 13th, 1872. Has had a rupture on the right side for seventeen years. He has never worn a truss, but till seven years ago could always reduce the swelling; since that time it has never gone back.

Four days ago, while straining, he felt something give way in his right groin, and was sick almost immediately afterwards. He was sick again seven hours after, and on and off since then. He has taken no food. The bowels acted freely three days ago, and slightly to-day.

On admission.—A large elastic swelling occupies the right side of the scrotum, distending the skin of both sides, and burying the penis. It measures eight inches vertically and six inches across. The greater part of the tumour is resonant on percussion; but at the neck of the tumour is a more resistant cylindrical mass, extending from the external ring for two or three inches down the cord, which is dull when percussed, and which is somewhat painful on manipulation. There is no impulse on coughing. The abdomen is resonant and the liver is large. Face bloated.

He was ordered Pulv. Doveri gr. xv statim, and an injection was given by the bowel. The bowels acted freely every day for six days, when sudden diarrhœa took place, the bowels acting many times in the course of twelve hours with abdominal pain. No vomiting or pain in the tumour. His pulse was irregular, 80 per minute; temp. 95°. Pil. Opii gr. j t. d., brandy ℥x.

The purging continued, in spite of opium and enemata, and he died seven days after admission.

At the post-mortem the sac was found to contain the cæcum and its appendix, with eight feet of small intestine. The mesentery was thickened and hardened like leather. There was no constriction at the orifice of the sac; two fingers readily passed through it, the impediment to return being apparently a large quantity of thickened omentum. The intestine was slightly darker than that in the abdominal cavity, but appeared otherwise normal and healthy. No appearance of lymph.

Case 30.—*Small Omental Inguinal Hernia (reducible), simulating an enlarged gland in the groin.*

Mary B—, æt. 38, a widow, and nurse in the hospital, was admitted May 18th. She states that during her work on a particular day she had occasion to lift a heavy copper which she felt to be too much for her strength. The same night she felt a lump in the right groin and had nausea, though she did not vomit. To this latter symptom she did not attribute much importance, for she was in the habit of feeling very sick at times during the performance of her ward duties.

When examined the next morning there existed a nodular elongated swelling, just above Poupart's ligament, rather deeply

situated. It gave to the touch the characteristics of an enlarged gland, but, at the same time, it had an elongated cord-like neck running in the direction of the inguinal canal. There was no impulse or increase of the tumour on coughing. It was very painful on manipulation. The bowels were confined. No vomiting.

Ice was applied, and she was kept in bed. The tumour gradually diminished in size, and by May 23rd was not much larger than a small bean.

On May 26th it was found that the swelling became distinctly larger when she stood up and made any exertion. When in the recumbent position very little can be felt. The patient left the hospital on June 6th in the same condition, wearing a pad over the inguinal canal and ring.

In addition to the two cases of hernia narrated *in extenso*, and in which no operation was performed, two others have occurred apart from those which have fallen as emergencies to the care of Mr. Howse, who acts in my absence. One of these, an incarcerated umbilical hernia with fæcal fistula, formed the subject of a clinical lecture published in the 'Lancet' of February 3, 1872.

Fistula in Ano.

Only four cases have occurred, three in males and one in a female. The operation was conducted in the way I have frequently described, viz. by passing a grooved probe along the sinus from the external opening into the gut, and pulling it out at the anus; all the soft parts down to the groove of the probe are then divided, and the probe being thus freed a small piece of lint is inserted in the wound for twenty-four hours to prevent adhesion, after which, time and a thorough attention to cleanliness alone are necessary.

Hæmorrhoids.

Three cases of inflamed external piles in patients of the ages respectively of 29, 36, and 53, have been admitted. A few days' rest with aperient medicine have caused them to subside. Four cases of internal piles have been subjected to ligature and have all done well, in patients at the ages of from 22 to 32. They were all

more or less blanched from loss of blood previous to undergoing treatment. To allow patients after the operation of ligature of hæmorrhoids to get up too early is, I think, a great mistake. The ligature must, when the pile and the silk have come away, leave an open sore, for which, did it occur in the leg, the surgeon would, as a matter of course, recommend rest in bed; why, therefore, the corresponding treatment should be omitted in the case of an ulcer in the rectum I am at a loss to understand. I invariably keep my patients in bed until I have reason to believe that the surface is covered by epithelium. Whatever plan is adopted for the removal of piles, whether clamp, nitric acid, or cautery, the same precaution ought to be adopted, otherwise the full measure of success is not secured. The ligature is frequently condemned because it is old-fashioned, whilst the more recent plans by écraseur, electric cautery, or hot iron, are substituted. I have tried them with results equally good as those of the ligature, but with all my desire for improvement I cannot see that there is any decided advantage. The operation should always be followed by a suppository of morphia, one third of a grain.

Case 31.—*Cystitis; Ascarides.*

Percy A—, æt. 3, admitted August 7th, 1872. He has been usually in the enjoyment of good health, except that he wetted the bed at night. Only five days ago something wrong was first noticed, when he complained of pain in the penis and called out often, at the same time pulling at the prepuce. He wanted to pass water and could not do so. The next and every succeeding day he had a catheter passed twice.

On admission.—The child has a large head, with long eyelashes and well-formed features. The teeth are good. No sign of rickets. He has a good deal of pain when he tries to pass urine, and is unable to do so. The prepuce is not abnormally long or contracted. A sound passed under chloroform struck against a rough bladder with slight grating, but no stone was detected. The urine when drawn off is slightly turbid, with phosphates in it and small grit, which effervesces with nitric acid.

He was ordered Mist. Potassæ Bicarb. ʒij, Tr. Opii ♏j, t. d. This was changed to Liq. Strychniæ ♏j, with Syrup. Aurantii

ʒss, Aquæ ad ʒj, on the 14th; and some ascarides being noticed, Infusion of Quassia was ordered as an injection.

17th.—Child much better, he has passed his urine without assistance since 14th.

19th.—Quassia injection repeated. He still has pain when passing the urine and cries much.

26th.—The child left the hospital well to-day, having had no other treatment beyond the Strychnia and Injection of Quassia several times repeated.

CASE 32.—*Vesical calculus; Lithotomy; Recovery.*

John W—, æt. 3, admitted December 13th, 1871.

The child lives in the Boro'; no gouty tendency in the family and no history of stone. Five months ago, during an attack of whooping cough, it was noticed that he had difficulty in passing his urine with sudden stoppages, and the stream was passed with pain, which was more severe as the bladder emptied.

Advice was sought at another hospital, and he was sounded six separate times without any stone being detected. He has not improved.

On admission.—He has inability to hold his water, without any other urinary symptom. A sound passed immediately strikes a stone of some size. The child is in no pain, even though he gets up and runs about the ward; the urine cannot be examined because he has incontinence.

A week after admission I removed a lithic acid calculus by the lateral operation. The perineum was small and the bladder closely contracted, for which reasons some little difficulty was experienced in catching the stone, but when caught it was easily extracted. A little bleeding occurred after the operation, but with ice and pressure was easily controlled. The boy went on quite well, urine came by the urethra on the tenth day, and the wound was closed to the passage of urine on the sixteenth, and quite healed a month after the operation. He was detained in the hospital for circumcision to be performed, and left on February 12th, 1872.

The circumcision was not very successful owing to the production of contractile lymph in the prepuce, which ultimately prevented its retraction.

Case 33.—*Vesical Calculus; Lithotomy; Recovery.*

Alfred W—, æt. 11, was admitted March 27th, 1872.

He was in the same ward seven months ago, and lithotomy was performed by my colleague Mr. Howse, acting for me during my absence. The boy was quite free from pain till ten weeks ago with normal micturition; since then he has had a good deal of pain, and the urine has run away. He has passed a little blood.

On admission.—The urine contains a good deal of thick mucus and is rather offensive.

April 4th.—Chloroform given and a stone detected by sound.

9th.—The bowels having been cleared out by fifteen grains of scammony and jalap, the lateral operation was performed and a stone weighing 312 grains extracted. It measured one inch and a half by one inch and three quarters, and was composed of an irregular granular nucleus, with a thick phosphatic layer externally.

1st day, 10th.—Temp. 103·4°; pulse 128; all the urine has come freely by the wound; no hæmorrhage. 7th day, 16th.—Urine has come to-day per urethram, some still comes by wound. 11th day, 20th.—All the urine comes now by the urethra; the perineal wound is healing fast. 22nd day, May 1st.—Patient left the hospital quite well.

Case 34.—*Vesical Calculus; Lithotrity; Death.*

George S—, æt. 63, a farm labourer, was admitted November 29th, 1871. No history of gravel in his family. Has had stone symptoms on and off for fourteen years.

He first noticed that his urine stopped suddenly, and he had to micturate every few minutes. No sediment noticed at that time. In a day or so he passed urine quite properly, and then remained free for a year or two. He then began to be bad again in the same way, and again got quite well. He, however, continued to pass blood now and again, generally two or three times successively when it did begin. Four years ago he passed a small stone, and again, a year and a half afterwards, another but smaller one.

For the last four years he has never been free from trouble

with the urine; blood passes at times, and at others the water is very thick. Pain varies much; sometimes walking hurts much, at others he feels nothing of it.

Five weeks ago an instrument was passed by Mr. Barrett, of Pewsey, and a stone was felt. His urine was thick and contained pus, but was not offensive.

November 30th.—Examined by me with an ordinary sound, and the impression conveyed was that of a large stone. To take Potassæ Bicarb. ʒss, Tr. Opii ♏x, Aquæ ad ℥j, t. d.

December 4th.—Size of stone gauged by a lithotrite. The diameter of it when first caught measured an inch and a half; the second time the index registered an inch. It was seized and crushed seven times during ten minutes. The patient complained of excessive pain while the lithotrite was in the bladder, otherwise nothing unusual occurred. The patient was submitted to three other sittings, and went on well till January 4th, when it is noted that he keeps his bed and looks very ill; tongue parched and leathery; temp. 98·8°; pulse 76; urine still contains much mucus and pus, but is not worse than it has been. He gradually got weaker, falling into a typhoid state, and died on January 10th. His temperature kept at 98°.

Post-mortem.—The abdomen only was opened. The bladder was contracted, containing some thick, purulent, very offensive urine. The mucous membrane was congested; at its neck lay six or seven large angular fragments of a lithic acid calculus, and behind these the stone from which they had come. It measured $2\frac{1}{8} \times 1\frac{1}{2}$ inches, with irregularities at one end; it weighed 840 grains. The ureters were dilated and tortuous, and both kidneys were large and extensively suppurating. The left kidney had, in addition, a large perinephritic abscess about its upper part, containing several ounces of pus.

This case is reported in the 'Lancet' of October 26, 1872.

Case 35.—*Vesical Calculus; Lithotrity; Recovery.*

Peter W—, æt. 56, master mariner, living at Plumstead, was admitted on May 22nd, 1872, with the following history:—Twenty years ago he noticed a few little pieces of stone in the urine. They gave him no pain, either before or during their passage, and he remained quite well till three years ago.

Since then he has been troubled with a stricture and with thick sediment in his urine. A year ago he had a perineal abscess, and instruments were passed for him, and the stricture dilated. He has occasionally passed instruments for himself since.

In February last he noticed that, though the passage of urine was free at the commencement, during the latter part of micturition the urine would suddenly stop and give him pain along the urethra. He has been getting worse since then.

On admission.—He is a somewhat pallid man, with good general health. The urine is thick and very offensive, with a large layer of slimy-looking pus at the bottom of the vessel. This, he tells us, is as it has been for the last three years. At times he has been worse.

A catheter passed along the urethra detects a narrowing of the passage in the membranous part, but through this a No. 8 sound passes easily. The sound strikes a stone in the bladder, apparently of moderate size, and little pain is experienced in the sounding.

May 28th.—The passage of a full-sized lithotrite was attempted, but the urethra was small and would not admit it, even after it had passed the orifice. A small one was substituted for it, and a stone struck but not caught between the blades.

June 4th.—Lithotrite passed again, and the stone caught in a three-quarter inch diameter. A second fragment was afterwards crushed and some débris withdrawn in the scoop. A good deal of urine, with brownish-red decomposing blood, was passed soon after the operation.

The calculus was composed of phosphate of lime and magnesia. Subsequently the fragments were crushed at four different intervals and the last time on June 20th; I could only detect one small fragment,—such an one as was passed two days later. The urine is now much more healthy; it often is nearly clear, and at its worst contains but little pus.

He left the hospital June 24th, 1872.

Case 36.—*Incontinence of Urine after Lithotomy.*

William D—, æt. 9½, admitted November 14th, 1871.

He was cut for stone seven years ago. He was discharged cured of this, but he has had incontinence ever since. He has never again complained of pain such as he had before the operation. His urine only runs away during the day, he never wets the bed at night. His mother has noticed sediment in the water after standing it by for a while; he never passes any blood. Bowels regular. No prolapsus ani. No ascarides have been noticed at any time.

November 16th. — Urine light straw-coloured, quite clear and healthy. He was ordered to be treated with the continuous current; this was at first applied by one pole to the back and the other to the sacrum. This was afterwards changed to a belt round the hypogastric region and a sponge in the upper dorsal region. This was continued till December the 15th twice and three times a week; he was not much if at all improved by this treatment. He has left the hospital.

This is one of those cases, not so very uncommon after lithotomy in children, of incontinence owing to injury done to an undeveloped prostate. Very little can be done for them; the incontinence continues till the age of puberty, when the prostate enlarges and then the patient becomes quite well. An important symptom of this kind of incontinence is, that the urine is retained during the night, and only passes away by day. During the night the urine gravitates away from the neck, and no sphincter is required to prevent its egress. After puberty no inconvenience is ordinarily experienced from permanent contraction of the bladder. This it would seem does not often occur even though the want of control over the urine has been long continued.

Case 37.—*Hæmatocele.*

William S—, æt. 62, a brushmaker, received a severe blow on the penis and scrotum by falling against some pieces of wood. He mainly struck himself on the right side over the cord. The pain was excessive though transient. He felt faint and sick,

but did not vomit. Swelling and ecchymosis occurred very quickly. He has passed no blood with his urine.

On admission.—The skin of the penis and scrotum is of a dark purple colour from superficial ecchymosis. The scrotum measures 6 inches by 5; much of this enlargement is due to œdema; but on the right side is some solid swelling over the cord, and the testicle also is apparently enlarged. It does not appear that there is much, if any, *fluid* in either tunica vaginalis.

The parts were treated at first by the application of cold spirit lotion, elevation of the parts and rest. I consider that it is never advisable to apply ice to the scrotum in old people, as it is likely to produce sloughing or gangrene of parts so feebly supplied with blood.

On June 9th much of the superficial extravasation in the scrotum had gone, but it was evident that the right tunica vaginalis was full of fluid.

He was kept for another month on the same treatment as at first, and the hæmatocele gradually diminished, though still remaining of large size.

On July 9th chloroform was given and the tunica vaginalis slit up by an incision five inches long. The testicle lying very much in front of the clot was somewhat extensively incised; before the operation it had appeared probable from the sensations of the man that the organ was lying posteriorly and out of harm's way. The clot, which was still black and jelly-like, was removed to the extent of eight ounces. The incision in the testicle, which extended through the tunica albuginea into the tubular structure, did not bleed, and was sewn up by some fine silk sutures. The organ was then replaced in the scrotum and the parts dressed with water dressing.

The man had a good deal of suppurative fever for some days, the temperature keeping at 102·5° or thereabouts, but the wound gradually granulated from the bottom, and he left the hospital with the incision nearly healed on August 21st. Nothing more was seen of the testicle after its replacement on the day of operation, neither were the sutures seen in the discharge.

September 10.—The incision has now quite healed and the man goes to work.

Case 38.—*Scrofulous Disease of the Testicle.*

George F—, æt. 26, a carman, was admitted July 24th, 1872. He had had gonorrhœa twice ; the last time a year ago. He had orchitis at that time upon the temporary cessation of the urethral discharge. For four months the testicle continued to increase in size and then gradually became smaller. Fluid was drawn off some weeks back. He has lately lost flesh and his health is failing.

On admission.—The patient is thin and looks phthisical. There are signs of disease at the apices of the lungs.

The left side of the scrotum is distended and measures six inches from the groin to the scrotum. The upper part of the enlargement consists principally of fluid, and the lower part is hard and irregularly triangular. The greater part is devoid of any painful or testicular feel; but he has some normal sensation, as of testicle, on pressure at the upper and posterior part.

A small abscess exists in front of the mass, and a probe passes a little way into its substance.

He was ordered Tr. Ferri Perchlor. ♏x, ex Aquæ ℥j, t. d.

July 31st.—Hydrocele tapped. Sweats a good deal at night. He now had a severe attack of diarrhœa, which was only arrested with some difficulty. The testicle continued much in the same condition, the abscess discharging continually, but to no great extent. It was not thought advisable to interfere further, looking to the patient's general condition, and he soon afterwards left the hospital.

Case 39.—*Nodular Enlargement of Left Testicle.*

John P—, æt. 46, a marine, was admitted on June 8th, 1872. He had gonorrhœa years ago. No history of syphilis. A year and a half ago he noticed swelling at the lower part of the right side of the scrotum "in the testicle itself." This gradually and painlessly enlarged. He was admitted to Portsmouth Hospital and the swelling was tapped, some fluid drawn off, and the tunica vaginalis injected with iodine. A cure resulted.

Six months afterwards a swelling began in a similar way on the left side. This was tapped, and subsequently injected with

iodine. The swelling subsided slightly, but never completely, and lately the scrotum has commenced to swell above the testicle.

On admission.—The right testicle seems of normal size, mobility, and sensation. The left side is much enlarged and irregularly so. The testicle is pushed downwards to the lower part of the scrotum, and is nodular, heavy, and hard, measuring four inches in length. At the upper part and running up along the cord is an ordinary hydrocele. No enlargement of the glands in the groin. The testicle is rather tender at the lower part, and, though having something of the usual testicular feel is nothing like the other in sensitiveness.

The hydrocele was tapped and the testicle then strapped with Scott's ointment, and this treatment was continued till he left on July 22nd. He was advised on leaving to continue the application of the ointment for some time; and, should no benefit result, to come up with the intention of having the diseased organ removed.

CASE 40.—*Encephaloid Disease of the Testicle.*

Henry A—, æt. 26, a parchment maker, was admitted on December 13th, 1871. His parents are healthy, and no history of tumour in any of the family can be ascertained. He has lived a very unsteady life in the way of drink, but he has never had any venereal disease. Eighteen months ago he began to feel a dragging pain in the left side of his scrotum, and he noticed that a swelling existed. It has gradually increased to its present size, but he has managed to get along with it.

On December 3rd he had it explored in the out-patient room. It was tapped twice; nothing came away the first time, and at the second only a very little blood-stained serum.

He is a married man, and has one child quite healthy. The appetite has been falling off latterly, and he has had an inclination to vomit after food. The bowels have been very confined. Three weeks ago a lump came on the left side of his neck, which has been getting larger.

On admission.—Is a pale and spare man. On the left side of the neck the posterior triangle is occupied by a smooth, oval, elastic non-fluctuating tumour. It appears immediately above

the clavicle, and extends directly upwards. It is apparently of a glandular nature, somewhat adherent to the deeper tissues at its lower part, well-defined above, but going beneath the clavicle below. Respiration is unaffected, and the chest sounds are in all particulars healthy.

The abdomen contains several large masses in the region of the left lobe of the liver, and all about the left lumbar region. The spleen is a good deal enlarged, but the liver not apparently so.

On the left side of the scrotum is a large fluctuating swelling, very tense and heavy, and with large veins over the surface. At the lower part behind is a nodule, of stony-hard feel. The whole tumour is perfectly opaque, not translucent.

The cord is not much enlarged; no hernia or varicocele. The circumference of the tumour at its largest part measures fifteen and a half inches. Temp. 99°; pulse 100.

December 21st.—Scrotal tumour much the same. The growth in the neck, however, is larger, being more prominent upwards, and now distinctly lobulated. The bowels are confined, and he has a good deal of abdominal pain towards night.

It was thought quite unjustifiable to attempt any operation in the case, so the man left the hospital December 26th, 1871.

The diagnosis in this case rested between hydrocele, general lymphoma or leukæmia, and malignant disease. The first was excluded by the evidence obtained from puncturing the swelling; no fluid came away. Encephaloid disease was decided upon in preference to leukæmia, b ecause, though the spleen was enlarged the liver was not, and no general lymphatic growth existed, as is usual in cases of Hodgkin's disease.

P.S.—This patient died at his own home on January 16th, 1872, twenty-one days after leaving the hospital. The scrotal tumour increased largely in size, and a few days before death opened and discharged a great quantity of pus. He, however, did not suffer so much from this as from his neck. The tumour in this region rapidly enlarged after leaving the ward, thereby causing much difficulty in breathing and also in swallowing, so that he was unable to take any food for five days before his death. An opening occurred here also a day or so before death, discharging a quantity of matter, and his mother states that the external swelling then entirely disappeared.

Case.	Age.	Duration of disease.	Gonorrhœa or not.	Injection.	Previous treatment of stricture.	Fistulæ.	Preparatory treatment in the hospital.	Instrumental.	Length of stay.	Remarks.
1	32	—	No	—	—	None	Rest with iodide of potassium.	Dil. with cath. 1—9	42 days	Stay much prolonged on account of syphilitic ulcers.
2	47	3 years	Gonorrhœa	Yes	Catheterism	Yes	Alkalies with opium	2—10	61 days	
3	50	2 years	Gon. 32 years before	—	Occasional cath.	Many	Rest, sinuses opend.	½—8	51 days	Sinuses closing.
4	38	1 year	Gon. 19 years before; discharge for a year	Yes	Catheterism	None	Rest, baths, alkalies, and opium	1—8	27 days	
5	54	12 years	Not stated	—	Regular self cath.	Yes	None	8 kept in	33 days	
6	47	12 years	Gon. 12 years ago; discharge ever since	—	None	do.	Rest, warm baths, opium	Perineal section	7 months	Passes No. 8. Fistula open.
7	26	4 months	Gonorrhœa	Yes	do.	do.	None	7—8	—	Removed to medical ward for pneumonia.
8	52	12 months	do.	No	do.	None	Opium, rest	1—10	36 days	
9	51	12 years	do.	do.	Occasional cath.	Yes	None	1—10	24 days	
10	52	1 year	Gon. many years ago	do.	Nothing	No	Rest and opium	1—10	?	
11	55	6 years	Gon. 6 years ago	Yes	Occasional cath.	None	None	3—6	5 days	
12	38	2 months	No gon.; drinks hard	—	None	do.	Rest with Dover's powder	4—6	27 days	
13	28	4 months	Gonorrhœal discharge lasting months	None	do.	do.	Alkalies with opium	1—10	42 days	Treatment of stricture delayed for 19 days on account of cystitis.
14	61	20 years	?	—	do.	do.	None	2—6	5 days	
15	29	4 months	Gon. 5 years ago	Not ascertnd.	do.	do.	do.	3—4	21 days	A rectal fistula formed during treatment. It closed in a few days.
16	50	5 years	Gon. frequently	—	do.	do.	Rest and baths	4—6	14 days	
17	66	3 years	Gon. for 6 weeks 27 years back	None	do.	do.	Rest, alkalies and opium	1—10	15 days	
18	36	13 years	18 years ago gon.	do.	Occas. self cath.	Yes	Warm baths, rest	8—10	25 days	
19	50	7 years	Gon. 13 years back	Yes	do.	None	Alkalies, opium, baths, and rest	2—10	27 days	
20	51	12 years	Gon. some years back	None	do.	Yes	Rest for 3 days	1—10	24 days	

Stricture of the Urethra.

From the foregoing Table some few facts already well known to most surgeons, but not, I think, sufficiently estimated, may be advantageously reviewed. It will be observed that, with one or two exceptions, all the twenty patients were at or about the middle period of life, and that though the stricture in many cases had existed some years, in almost all it had commenced at or about the period stated.

The fourth column shows that gonorrhœa had occurred in almost all the patients, but at such a remote period from the first appearance of a stricture that the two could not be supposed to possess any relation of cause and effect. This fact has been known to surgeons who have thought much on the matter for many years, but yet still so widely prevalent is the idea that in some way stricture and gonorrhœa are connected that it will take a generation at least to combat the notion; an inspection of the fourth column with the next one shows that the use of injections cannot have much to do with the result. Gonorrhœa does not produce a stricture *per se;* this, I think, I may safely affirm from a somewhat exhaustive inquiry into the pathology of chronic gonorrhœa and gleet made now some years ago on board the Dreadnought. After the examination of many post-mortem specimens I have failed to find anything that could be shown as the consequence of gonorrhœa or as the probable cause of a stricture. I find it hard to believe that the slight irritation set up by a gleet should end in a stricture years afterwards, as is sometimes stated. Is it not much more likely to be produced by the intermittent stretching and relaxation that the penis, and with it the urethra, undergoes in its very varied conditions?

Every one must have seen cases of stricture where the patients have never had gonorrhœa—though, doubtless, a very large proportion of the adult male population at some time or another get such a disease—even though the proportion of such cases of stricture is but small; then again large numbers of patients have gonorrhœa without any stricture following. On the whole, therefore, I fall back upon the conclusion that if there is no hereditary predisposition to the disease, some slight inflammatory thickening may have taken place in the healthy urethra

as the result of unequal distension of the parts, and at the weakest spot.

Upon the admission of cases of stricture to the hospital I always enjoin a week or ten days' rest with alkalies and opium combined with warm baths, and generally find by so doing that instrumental dilatation is much more easily conducted than if the patient immediately upon admission is submitted to catheterism. Most of my dressers fail to pass a catheter when the patient first comes in, but succeed in their endeavours after a certain time. This period of rest necessarily causes a rather prolonged stay in the hospital, as it is more than possible that one errs on the side of postponing instrumental dilatation a few days longer than necessary. All the cases under my care have been treated by continuous dilatation and by the ordinary gum elastic catheter; commencing with the largest size that the stricture would admit, the dilatation has generally been somewhat rapidly conducted. After the full dilatation a few days are allowed to elapse ere the patient is discharged from the hospital. I have seen no particular advantage that could have been gained in any of my cases by the use of dilators or bougies, such as the bougie à boule or the bougie olivaire. Silver instruments are almost unused by me.

Case 41.—*Ruptured Perineum; Operation; Abdominal Abscess, &c.*

Elizabeth W—, æt. 27, was admitted October 28th, 1871. She is married, and was confined eleven weeks ago. She had a lingering time, and after some fits chloroform was given and instruments applied. The perineum was ruptured and sewn up immediately. When the sutures were taken out the edges separated again.

On admission.—There is complete rupture of the lower part of the septum between the vagina and rectum; the posterior commissure is torn through, and the external sphincter also is gone. She has control over her motions.

November 1st.—The edges of the fissure between the vagina and rectum were pared and brought together by three deep interrupted sutures, which were passed in about an inch from the margin of the fissure.

She unfortunately passed water the same evening without the introduction of a catheter. Half a grain of opium was ordered three times a day.

2nd.—T. 100·7°; P. 100. 3rd.—T. 101·2°; P. 108. Serous discharge from the wound. Slight and diffused redness about the perineum.

6th day.—The sutures were removed to-day.

10th day.—The posterior part of the pared surfaces has united. A good deal of suppuration still goes on, most of it apparently coming from the tracks of the sutures. The temperature has ranged from 99° to 103·4°.

14th day.—The new perineum extends from the anal aperture forwards for half an inch, where a small aperture exists, which will admit the tip of the little finger, and again in front of this comes another small strip of perineum.

17th day.—Bowels open to-day for the first time since the operation.

21st day.—A small quantity of fæcal matter has passed per vaginam since the bowels began to act. This has come through an aperture which exists between the rectum and vagina immediately inside the new perineum. Through this the index finger tip can be passed from the one passage into the other. The opening between the two bridges of new tissue will now only admit of a probe passing, so much has it contracted.

34th day.—The opening in the new perineum has nearly closed and she has a very serviceable septum now. The aperture between rectum and vagina has contracted much and only troubles her when the bowels are relaxed. Patient left the hospital.

58th day.—Readmitted to-day for an abscess in the abdominal wall, situated in the left inguinal region. It measures five and a half by six and a half inches, and has no very apparent connexion with any of the viscera beneath. This was opened under carbolic spray, and about ten ounces of very fœtid pus evacuated with some decomposing blood. The opening was closed by Lister's protective and gauze.

7 p.m.—Some hæmorrhage has occurred; chloroform was administered, some clot turned out of the abscess, and a small vessel in the abdominal wall twisted.

The carbolic dressings were not reapplied.

The patient now says that ever since her confinement she has felt pain at the spot, and she has noticed a small lump there for some time. The recto-vaginal fistula still troubles her a little when the bowels are relaxed. From this time she did well, but the abscess filled up very slowly. When she left the hospital three months later a sinus still existed, leading deep down towards the pelvis; but very little discharge occurred from it.

She refused to have the vaginal fistula touched any more until she experienced more inconvenience than she then did.

Case 42.—*Multilocular Ovarian Cyst; Ovariotomy.*

Emma L—, æt. 26, married three years, but without family, was admitted May 2nd, 1872.

Three years ago, six months after marriage, she noticed a swelling in the left side of the abdomen. No treatment was adopted for this for eighteen months, as it gave her no trouble. The catamenia were quite regular, and the bowels and bladder acted properly.

She was admitted to Guy's in November of last year under my colleague, Dr. Hicks, and was tapped on December 20th, twelve and a half pints of coffee-coloured fluid being evacuated. She left within a week, and could not feel the slightest lump remaining in the abdomen.

About the 7th of March she noticed that her bandage was becoming tight, and since then she has increased in size rapidly.

On admission.—The catamenia appeared eight days ago, and have only ceased to-day (May 2nd). She has passed urine rather frequently of late; in all other respects she is healthy; the appetite is good, and her spirits excellent.

Abdomen prominent in front; bulging more on the right side than the left. There is dulness all over, with fluctuation between the extreme parts of the tumour. No dimpling is observed on making the abdominal muscles act, but there is no obvious descent of tumour during respiration. Per vaginam, slight bulging exists on the right and anterior to the cervix, in which bulging impulse can be felt on tapping the abdomen; cervix tubular, and pressed downwards; os uteri circular and small.

The operation was performed on May 4th by an incision about four inches in length, commencing an inch below the umbilicus, and extending downwards. Only a single cyst existed, and it had a broad thin pedicle, round which a clamp was fixed. Slight adhesions were found on the left side, but these gave no trouble either in separation or after treatment.

Four sutures were inserted through the whole thickness of the abdominal wall, and two superficial ones. A suppository of morphia was administered at once.

The cyst which was removed was of large size, and contained another small cyst the size of a filbert in its wall. The lining membrane of the parent cyst was vascular, gelatinous, and villous in places, the villous spots being covered over with papules, consisting in every case of a central blood-vessel, or loop of capillaries; around this, and covering it in, came a large number of round or oval cells containing a single nucleus, while the external layer consisted of regularly arranged columnar epithelium. Thus it will be seen that the tumour had all the characteristics of a compound cyst, though as yet it had not become multilocular.

She had a good deal of vomiting after the operation, and on the third day a pulse of 150, and distended abdomen. Matters looked anything but favorable, but she revived considerably after the liberal administration of brandy. On the fourth day the clamp came away from the pedicle, and was removed. The wound had healed, except quite at its lower part, by the tenth day, and the stitches were removed.

From this time the case became very tedious; the abdomen remained much distended with flatus, and the temperature kept high.

The flatulence subsided about the sixteenth day, but the temperature continued as high as 102° for five weeks after the operation; the pulse varying from 108 to 120.

She left the hospital well on June 23rd, seven weeks after the operation. The elevated temperature in this case must remain a mystery unless the reparative processes within the abdomen, long after the external incision had healed, could have kept it up. There was no escape of pus from the wound that could in any way account for so great and prolonged a constitutional disturbance.

Ovariotomy has been performed by me in only this one case during the year. I was about to operate in a second case, when rupture of the cyst took place, the abdomen was occupied by a general swelling, and with some prominence on the left side. The greater part of the swelling, however, consisted of fluid in the peritoneal cavity, fluctuation being felt from side to side of the abdomen. Measurement, $35\frac{1}{8}$ inches round the umbilicus. There was no great distension of the abdomen and no pain on manipulation. It was dull except in the epigastric and both lumbar regions. Breathing and making the abdominal muscles act gave no indication as to the fixity or not of any tumour. The rupture took place the morning I was about to perform the operation. She stayed in the hospital seven weeks, passing a large quantity of urine, which was at times highly albuminous. She left the hospital apparently well.

Hysteria.

In four cases hysterical affections manifested themselves in various regions of the body, in one in the hip, in one in the heel, in one by spasm of the cervical muscles, and the fourth with the very old story of insertion of needles under the skin. The rapid termination of each case points out sufficiently the correctness of the diagnosis, notwithstanding that one of the patients was forty-six years of age.

A curious case of paresis of the muscles of thigh, in a young man æt. 25, is also included in this series.

Case 43.—*Hysterical Talipes Varus.*

Jane W—, æt. 15, a nursemaid, admitted on April 3rd, 1872. She was quite well three months ago. One evening she felt pain in the right foot, and on taking off her boot she found her foot all one side. Since then the distortion has increased, and has caused her much pain.

On admission.—The foot is somewhat drawn up by the flexor tendons when standing, and she walks on the outer side of it. If the foot be straightened she complains of much pain on the outer side, between the tubercle of the os calcis and the

base of the metatarsal bone of the little toe. There is no rigidity or shortening of any of the tendons.

I thought there might possibly be some paralysis of the peronei muscles from tight gartering, but, with this exception, the distortion of the foot was evidently voluntary, and was quickly cured by the application of a back splint for a week. She left well on the 19th of April.

CASE 44.—*Hysterical Spasm of Cervical Muscles.*

Eliza H—, æt. 46, a servant, living in the country, was admitted February 22nd, 1872. Unmarried. Quite well *two years ago*, when, on opening a soda-water bottle, the cork struck her and knocked her head back. The eye became bruised, but no strain was felt till a week afterwards, when her neck became *stiff on the right side*, and her head was rotated to *the left.* She had pain on the right side of her neck and down the cervical spines. She has continued in much the same state since.

On admission.—She is a spare woman, and does not look particularly hysterical; she is in fair health.

Her symptoms are anomalous; for instance, the head rotates to the left side, but there is no contracted state of the sterno-mastoid or rigidity of that muscle, neither is its fellow on the right side wasted or abnormally lax. Both muscles appear to have a normal length and tonicity. All the pain complained of, and this anything but severe, is on the right side. Over the cervical spines there is indistinct tendinous crepitus, and she feels a crackling sensation here when bending her head, a statement elicited without any leading question on my part.

On the whole review of the case, however, there seemed to be no doubt that the only disease which could cause such symptoms was a mental one, and the diagnosis was accordingly to that effect. Faradization was commenced to the cervical muscles on March 2nd, and continued daily till April 12th, when she left the hospital well.

CASE 45.—*Hysteria; Removal of Needles from various parts of the Body.*

Annie D—, æt. 30, married, but without family, was admitted February 29th, 1872. She states that twenty years ago she swallowed some needles, and felt no inconvenience till January last, when, on stooping, she felt pain in the wall of the abdomen.

On February 15th she attended at the surgery, and two needles were removed from the right side of the abdominal wall. On the 20th two more were removed from the left side.

When admitted another needle could be plainly felt just beneath the skin of the right thigh, near the knee-joint, over which the skin was slightly discoloured. No trace of any recent puncture could be seen in the skin.

The patient did not obtain the requisite amount of sympathy in her trouble, and she accordingly left the hospital very shortly with the needle still *in sitû.*

CASE 46.—*Hysterical Affection of the Hip-joint.*

S. B—, æt. 15, a needlewoman, came in for pain in the left hip, which has been present for sixteen months. Both hip and knee are complained of. She gives a history of rheumatism in the family. Catamenia have commenced, but are irregular. She is a hearty girl, and complains of pain in the left hip and knee. She has no heat about the joint, no displacement, no shortening. Motion at the hip-joint good. A little pain in the joint on percussing the trochanter, or knocking the heel. She limps when walking.

Two days after admission she was again examined carefully. Nothing more was detected; so she was ordered to walk about and to take Mist. Ferri Co. ℥j ter die.

She left the hospital in eleven days quite well.

CASE 47.—*Paresis of Muscles of the Thigh after Injury.*

Edward Taylor, æt. 35, a clerk, was quite well till eight weeks ago, when the right knee-cap was kicked accidentally

while the patient was boxing. He felt the cap give, and go outwards off the condyles, the knee being bent under him afterwards, and he had no power to straighten it.

He pushed the bone back again, and was then able to straighten his leg. The joint became swollen after this, and was rather painful. He rested it, and kept cold water to it for four days, after which he went to his business. It has been rather stiff ever since, and he cannot quite straighten it.

When admitted his condition was this;—the knee-joint was slightly flexed when lying in bed, but it was easily straightened by pressure on the patella; it resumed its flexed position when the counteracting force was discontinued. There was no pain about the joint, no heat, no swelling, and he could flex it fully and easily.

In this case it became a question, then, as to what was the cause of the slightly flexed condition of the joint. The man had certainly received an injury; but it was equally certain, from all outward appearance, that no disease of the joint existed now.

The alternatives we were thus pushed to were, either that the man was malingering, of which there was not the slightest suspicion, or that we had to deal with a case analogous to one of so-called hysterical joint affection, in which the extensor muscles, in this case from injury, had become impaired in function, and the more powerful flexors had bent the limb.

Acting on this idea, a straight splint was applied to the back of the joint, and the man was told to walk about. By this means I thought that the muscles, receiving a little guidance, would in due time resume their mutual relations and the patient would be well.

He left the hospital after a fortnight's stay, not as yet quite well. The splint was, therefore, kept on when he left.

Injuries.

Twelve cases of scalp wound were sufficiently severe to need admission into the hospital, Erysipelas supervened in two only, and these occurred within two days of one another, the same dresser having charge of both.

The following case of injury to the head is well worth a note,

associated as it was with a pulse remarkably slow. A man, æt. 27, was admitted after a blow on the head by a log, four and a half pounds in weight, which had fallen on to him from an elevation of fifty feet. He was rendered quite insensible at the time.

When admitted, though sensible, he was inclined to vomit, but had no other cerebral symptoms and no visible injury to the head. Temp. 96·6°. Pulse 38, and slightly irregular.

The next day his pulse was 48, and he appeared quite well. It remained at this rate for three or four days while he kept in bed, but ran up to 80 when he got up. He left the hospital quite well.

The following are cases of injury of more than usual interest. They comprise—

Severe concussion of the brain in a boy, æt. 11, in which insensibility lasted for seventeen days, and during the whole of this time the result of the case was doubtful.

Rupture of the kidney, evidenced by extreme rigidity of the right rectus muscle, with hæmaturia for six days.

Inflammatory thickening about the left psoas, causing contraction of the corresponding leg, and only cleared up by the administration of chloroform.

A laceration of the ear and groin, the ear being nearly severed from the head; the subsequent termination being that the ear of this side became fixed at a lower level by half an inch than that of the other.

Pharyngeal fistula after cut throat. Case 101, last year's Reports. The patient left the hospital quite well on August 11th, 1871, and returned on February 28th, 1872.

Painful stumps after accidental amputation of the fingers by a knife. This case will well repay perusal. The stumps were left and allowed to granulate up by themselves, and were painful ever after.

Traumatic synovitis of hip-joint.

Dislocation on to the dorsum ilii in a child three years old.

Punctured wound of knee-joint.

Compound comminuted fracture of the skull, with cut throat.

There were also two cases of dislocation of the humerus, one recent, the other of five weeks' standing, sufficiently severe

to be admitted; both were reduced without much trouble. These are not reported in full.

Case 48.—*Severe Concussion of the Brain.*

Charles G—, æt. 11, was admitted on June 26th. He had fallen from the orchestra at the Crystal Palace into the refreshment-room, a distance of twenty-four feet.

On admission.—He vomited, the ejected matter consisting chiefly of food. Insensible, but resists any touch. There is considerable effusion of blood over the right side of the head beneath the scalp. No bleeding from either ear or nose. The child is very restless. No paralysis of either arms or legs.

June 28th.—T. 99°. Still insensible, but more restless when touched; complains of his head at times. Takes very little milk.

29th.—Consciousness returning. P. 72, regular. Sleeps much and shouts a good deal. Recognises no one yet. Milk taken well.

July 2nd.—Much shouting, otherwise he seems better. Temp. normal. P. 80, regular.

3rd.—Still cries out a good deal, but puts out his tongue when told to do so.

7th.—P. 92, rather irregular. Sleeps a good deal.

13th.—Boy now quite sensible. He does not recollect anything of the accident. He does not even recollect being in the orchestra at the Palace. He knows only that he bought a knife, an action supposed by his mother to have occurred about half an hour before the accident.

22nd.—The boy sits up daily and seems well.

26th.—Left the hospital.

Case 49.—*Hæmaturia; Rupture of the Kidney.*

Frank P—, æt. 15, warehouse-boy, admitted November 15th. He had been run over. He complained of pain in the abdomen, and could not stand alone. Did not seem much hurt; no bruises visible. Was put in bed. Referred the pain more especially to right hypochondriac region. The right rectus abdominis was very rigid and stood out in relief.

Had opii gr. $\frac{1}{4}$ every five hours and milk only. He vomited frequently, at first food, and then a greenish fluid, no blood. The urine contained a little blood and mucus.

2nd day, 16th.—Still in pain and vomiting. Expression anxious. Blood and mucus in urine less than on 15th. Temp. 100·6°, pulse 108. To have hot fomentations to abdomen, opium gr. $\frac{1}{2}$ every night, bread and butter with milk.

3rd day, 17th.—Still in pain. Vomiting has ceased. Urine albuminous.

4th day, 18th.—As on 17th. Temp. 99·2°.

5th day, 19th.—As on 17th. Much granular matter and uric acid crystals in urine, a little blood, few casts, no pus.

6th day, 20th.—Urine clear, little blood, few casts. Bowels open, normal. To have opii gr. $\frac{1}{4}$ night and morning.

7th day, 21st.—Urine clear, slightly smoky, some albumen. In no pain. Temp. normal.

9th day, 23rd.—Urine normal. Rectus still rigid.

10th day, 24th.—Appears well.

16th day, 30th.—Gets up, and has ordinary diet.

22nd day, December 6th.—Left apparently well.

Case 50.—*Inflammatory Thickening about the Left Psoas, the result of Injury; Cure by Rest.*

Henry H—, æt. 12, a boy at school, was admitted December 20th, 1871. Seven days ago he fell upon his left side and hip upon some gravel. Pain was severe at the time, and continued so in the hip for some days. It is better now than it was.

On admission.—The principal seat of pain is over and below the last rib. There is but little tenderness on manipulation, and no rigidity of muscles.

The spine and hip-joint are quite normal as far as pain goes.

When lying flat on the bed the left leg is flexed, and any attempt to put it down immediately tilts the spine, and he says gives pain in the left loin. When standing he flexes his body, and takes special care to relax the left psoas in all positions.

Chloroform was given, and then considerable thickening all along the left psoas muscle was felt. The limb was put on a long, straight side splint and bandaged up.

December 22nd.—Comfortable, but sick after chloroform. Abdomen full about the left groin, but no tenderness complained of. Pulse 112, temp. 100°.

Up to the 28th the thickening did not subside much, but extended lower down into the groin and below Poupart's ligament. His temp. also kept at 101°.

From this time his temperature fell, and all went on well.

The splint was taken off on January 22nd, and it was noted that a little thickening still remained over the psoas deep in the abdomen. Some stiffness of the muscles from confinement. No pain.

He got up on the 25th and went out of the hospital, walking well, on the 7th of February. All thickening had then subsided.

Case 51.—*Laceration of the Ear and the Groin.*

Thomas J—, æt. 11, a boy employed at a saw-mill, was admitted January 13th, 1872, with the following injuries. Two lacerated antero-posterior wounds of the scalp over the posterior superior angle of the left parietal bone. The right ear detached from the head at all but its lower part, where it hangs by a small strip of skin close to the lobule. A large, irregular wound is thus made at the side of the head, exposing the temporal fascia, and in the centre the temporal bone above the meatus auditorius externus. The cuticle is detached from the greater part of the right cheek, and there is a large blood tumour beneath the scalp in the frontal region. The lower jaw is fractured on the left side through the canine fossa, the milk canine being detached from its socket. In addition, there is a large excoriation of the skin from the fourth to the twelfth dorsal vertebra, extending two inches at least on each side; while in the right groin is a large laceration, extending from the spine of the ilium across the front of the thigh, and round its inner aspect nearly to the anus. This has laid bare and lacerated some upper fibres of the adductor magnus and the tendon of the adductor longus. The femoral artery can be felt beating at the bottom of the wound.

The boy is pallid and collapsed, but partially sensible. All the parts, which were completely covered with dirt and sawdust, were

well washed, but they could not be cleaned. The ear was then stitched to the scalp in proper position, and covered with oiled lint; it remained warm and vascular throughout. The edges of the wound in the thigh were also partly adjusted by sutures.

During the first few days the boy suffered from a good deal of febrile disturbance, the temp. being 102°, the pulse 108. With this exception he had no bad symptoms. The sore in the thigh healed most quickly, and was well by February 19th. A granulating surface above and behind the right ear was more tardy, and had not quite healed when he left the hospital on March 31st. The stitches inserted to keep the ear in its place gave way after a day or two, and, in consequence, the ear dropped rather, and was about half an inch lower than that of the left side, notwithstanding the attempts made to keep it in position by plaster.

Case 52.—*Pharyngeal Fistula after a Cut Throat.*

Henry W—, æt. 55, a coachman, was admitted on February 28th, 1872. Under my care in June of the previous year for a suicidal wound of the throat extending deeply on both sides of the neck above the hyoid bone, he left with the incision entirely healed. He remained well till Christmas, when he thinks, after trying it too much with solid food, an opening formed on the right side from which both food and saliva escaped.

On admission.—He has a cicatrix above the hyoid bone, extending on either side to an imaginary perpendicular dropped from the lobule of each ear. In the median line the skin is puckered towards the hyoid, causing a ridge, and a little to the right of this is a small pit, at the bottom of which is an aperture about a line in diameter, through which pass air, saliva, and any fluid nourishment that may have been taken.

His condition as to speech, &c., detailed in last year's volume of the Reports, need not be again referred to here.

On March 8th I cauterised the edges of the fistula by the galvanic cautery. The opening became larger afterwards, but ultimately contracted much, though it did not completely close.

On April 5th the galvanic cautery was again used; this time,

however, with the reverse of a good effect, for the fistula became much larger and did not afterwards contract as before.

On May 3rd the edges were pared and brought together by two deep silk sutures. Two days afterwards a fresh fistula formed on the other side of the larynx at the other extremity of the cicatrix, near the hinder edge of thyroid cartilage. A good deal of saliva comes by this and some food. He has noticed a dampness there for some time.

On the 14th it is noted that the old sinus has opened again, though it certainly discharges less than it did before the edges were pared. By the 20th both fistulæ had closed altogether, and on the 29th he left the hospital quite well.

Case 53.—*Painful Stumps after Laceration of the Fingers.*

Arthur Stephen D—, æt. 19, an engineer, admitted June 5th, 1872. Four years ago he cut off the tops of the middle and ring fingers of the right hand. The bone projected from each. They were left to granulate by themselves, oil dressings being applied to them. They have been painful ever since, but have been worse lately, and in cold weather are always worse than at any other time.

On admission.—There is pain on slight pressure over the distal half inch of the ring and middle fingers of the right hand. The tops of these fingers are enlarged and flattened out, and somewhat shorter than the index. The fingers are soundly healed, and in both the last pharyngeal joint is left. The contraction of the cicatrix appears to have been towards the palmar surface of the finger, and so contracting has dragged over the remnant of the nail which now comes to be placed, instead of on the dorsal aspect, on the top and partially on the palmar surface. The matrix of the nail is exceedingly sensitive, much more so than the surrounding skin.

June 7th.—The extreme sensitiveness of the fingers has somewhat subsided since he has left off work, as it has done before. Now pain is only complained of when pressure is made upon the two nails.

Chloroform was given, and the nail and remnant of each ungual phalanx excised. The flaps, which were scanty, were brought together by sutures and dressed with wet lint.

A careful dissection did not show any bulbous filament of nerve in the parts removed.

He left the hospital on June 2nd with the fingers nearly healed, and without any of the pain which he had on admission.

Case 54.—*Traumatic Synovitis of the Hip-joint.*

Henry L—, æt. 18, a railway boy, was admitted June 10th, 1872. While in his van he slipped on some iron, and his legs became stretched widely apart (abducted from the median line). The right thigh was arrested in its abduction, but the left was, as he describes it, stretched right out, and he fell in a sitting posture on some sacks. He had a good deal of pain for a few minutes, and then it all ceased, and he walked about for the rest of the day and the two following days. He then felt pain towards evening, which has increased ever since. His knee has troubled him more than the hip. Nine years ago he was in Guy's for necrosis about the malleoli of both feet.

On admission.—He is a healthy-looking lad. He complains of much pain in the left hip, and he moves his body with extreme care, to avoid communicating any motion to the affected parts. As he lies in bed the groin depression is flattened out, and full when compared with the other side; there are also some slightly enlarged glands in the groin. The limb is slightly everted. The left trochanter is markedly less prominent than the right, and on rough measurement, but as nearly exact as can be made between such indefinite points, there is an inch less distance between the anterior superior spine and the trochanter. There is some increase of heat about the joint. Very little pain on tapping the trochanter; not very much if the foot, slightly everted as it is, be rotated inwards. The pelvic muscles are rigid, and the hip-bone moves with the femur.

Temperature in axilla 100·4°. There is considerable shortening on the left side; but this is due to non-development of the limb on this side, as the principal amount of difference is in the tibia.

July 1st.—Joint examined under chloroform. No fracture detected, but a good deal of rigidity and impediment to rotation,

even when fully under an anæsthetic. Weight of six pounds applied to foot.

The patient continued to have some pain up to August 2nd. On the 13th he could raise his leg a little from the bed, and all pain had ceased.

September 2nd.—Patient out of bed and standing on his leg. This gives him no pain.

9th.—Patient walking about; considerable stiffness about the hip, and the pelvis moves with the femur to a great extent; but there is slight motion of the head of the bone without any of the pelvis. He walks without pain.

12th.—Patient left the hospital.

Case 55.—*Punctured Wound of the Knee-joint; Recovery.*

Charles W—, æt. 19, was admitted April 4th, 1872. While cutting a piece of wood with a new penknife the instrument slipped, and its point entered his left knee-joint on the inner side of the patella. No fluid was noticed to come from the wound, and he walked about on the limb for five hours afterwards, when he applied for admission. An incised wound was noticed to the inner side of the patella a quarter of an inch long. No synovia came from this. The lad had scars of old abscesses on his neck.

A short straight back splint was applied behind the knee, and an ice-bag over the front of the joint, and he was put to bed.

The next day the short splint was changed for a longer one with foot-piece.

There is some little increase of heat about the joint, but ice has been constantly applied.

April 6th.—The joint is cool and he has no pain. A considerable quantity of fluid is in its cavity, floating the patella forwards.

The fluid subsided under the influence of cold and rest, and had all disappeared by April 17th. The ice was continued till the 18th, and he was kept in bed till the 21st.

On the 22nd, after getting up, though he had kept the limb quiet on a splint, fluid again appeared in the joint, with an excess of heat. The knee was now strapped with compound

mercury ointment, and he was kept in bed till May 6th. The splint was removed on the 9th, and the injured knee found to be seven sixteenths of an inch larger than the right.

12th.—The patient walked out of the hospital without telling any one, and has not since been heard of.

CASE 56.—*Dislocation of the Femur on to the Dorsum Ilii in a Child.*

Thomas D—, æt. $3\frac{1}{2}$, was admitted August 23rd, 1872. The only history which could be obtained was that he had slipped down while playing; no one, however, had seen him fall. He was sent up to the hospital by a medical man who said he had put his hip out.

On examination.—The right foot was slightly inverted, the leg measuring one and a half inch less than the other. The child being placed under chloroform it was readily made out that a dislocation of the femur on to the dorsum ilii existed, the head of the bone being felt in that situation. The leg being flexed upon the thigh and the thigh on the abdomen the femur was rotated out and at the same time abducted; the head of the bone slipped without difficulty into its place. Weights were applied to the leg to keep up extension.

He went out on Monday, August 26th.

CASE 57.—*Compound Comminuted Fracture of the Skull; Cut Throat; Elevation and Removal of depressed bone; Recovery.*

William T—, æt. 43, was admitted on June 30th, 1872. The only history to be obtained was that he had been drinking hard for five days.

On admission.—He was in a weak state, the pulse being almost imperceptible. He had a wound across the neck between the cricoid and thyroid cartilages, opening the larynx; no important vessels were injured. The wound was jagged towards the left side. There is a ragged wound at the anterior part of the right parietal bone, through which a fracture can be felt. He had also two other smaller scalp wounds, not exposing the bone. He was put to bed, the house surgeon remaining with

him for some time; he was afterwards watched by a policeman. About six hours after admission he became excited, jumped from his bed and out of a neighbouring window near the ground, and running up into another ward behaved in a violent manner. He was now secured and strapped down; two hours later he was quite conscious, but still excited. Answered questions. Pulse, 110; temp. 100·6° in axilla.

July 1st.—Pulse 80, very feeble; semi-conscious; pupils contracted, but equal and sensitive. Inspiration noisy, but without much effect in filling the lungs. The fracture of the skull is evidently much depressed. Examination of the base of the right lung, the only region accessible to auscultation without disturbing him, shows no evidence of pneumonia. T. 102·6°, E. T. 103·2°; P. 96; R. 32.

2nd.—Chloroform was given and the fracture examined. The skull was found extensively comminuted and depressed; a circular or slightly oval piece of the external table was beaten in about one inch in diameter, while the internal table was implicated to a much further extent. The depressed parts were in many pieces and merely required elevation and removal. Water dressing was applied to the wound and ice generally to the head. His diet consisted of milk, beef tea, eggs, brandy ℥ij, and lemonade.

From this time he progressed very favorably. Some of the bone at the posterior part of the aperture in the skull became necrosed and required removal, and later on an attack of erysipelas slightly retarded his recovery. He had, however, no symptoms of brain disturbance after his first maniacal attack throughout his stay in the hospital, which he left for the jail infirmary in September with the aperture in the skull still open and measuring about one and a half by one inch.

Antiseptic Treatment.

During the past year I have tried the antiseptic treatment in many cases in which I thought it could be carried out satisfactorily. I have now before me the details of sixteen such cases of abscesses in various parts of the body, in which this plan has been, I think, fairly tried, in addition to numerous others, which it must be observed have been treated in a like manner. To ensure the thorough application of this method necessitates the

constant attention of the surgeon who has charge of the case, and practically in a London hospital such entire supervision is a simple impossibility. The practice, therefore, becomes virtually placed in the hands of the dressers, and unless these gentlemen take a great interest in improvements, or are not too much occupied with the many cases which almost overburden them during their respective weeks of duty, it is not likely to be taken up warmly by them. Moreover, the thorough method of application of the dressing is not acquired without considerable practice, and when acquired one's best efforts are often rendered futile by the restlessness of the patients. Hence the measure of my success during the last year has not been what I had hoped for, even in the comparatively few cases in which it has been attempted.

Whether or not the absence of pyæmia and erysipelas from the Wards has been due to the carbolic vapour permeating them, or to the application of the acid directly to discharging surfaces, of course I cannot speak positively, but my impression is that carbolic acid in whatever form has had very little to do with the results obtained, and that those curses of surgical practice (erysipelas and pyæmia) have been avoided by greater cleanliness in the Wards, and the larger cubic area allowed to each patient. That this immunity cannot be owing to the antiseptic treatment must, I think, be evident from the fact that none of my surgical colleagues who have charge of the other wards have used this antiseptic plan, and there has been in their case an equal immunity from erysipelas and pyæmia. The prevalent use of the carbolic acid lotion to all wounds and sinuses, and the steeping of cloths in it to hang about the wards certainly tends to destroy the noxious effluvia emanating from decomposing pus, and I see that Mr. Lister has lately been advising the dilution of the spray to one part of the pure acid in sixty of water. The atmosphere about a patient who has a large rag dipped in lotion of the strength of one in twenty standing close to his bed must be so much the more prone to be detrimental to all fevers. Isolated cases of wonderful results, under antiseptic means, are to be met with every now and then, but whether on account of, or notwithstanding, the treatment appears to me to be quite impossible to determine. But yet, though nothing definite can be fixed upon in its favour, I think if

I should happen to be the subject of a severe compound fracture I should like my case treated by Mr. Lister's plan. If the remedy, however, is only available in practised hands, I cannot think it advisable to teach students that it is the one plan of treating all cases of external wounds. My results do not even bear me out in telling them that it is the most advisable treatment to be adopted ; it is impossible to compare case with case. In the only very severe accident in which I tried the plan myself, taking every precaution that possibly could be adopted to ensure the treatment being carried out in its entirety, I utterly failed to secure a good result ; the case was one of compound dislocation of the astragalus and wound of the knee-joint. The astragalus was excised and the wound treated antiseptically ; the knee-joint, which was freely laid open by a wound of an inch in length, was also treated in the same manner. Notwithstanding, the temperature rose rapidly, and the suppurative fever was extremely severe ; pus burrowed extensively along the muscles of the thigh and leg, and the man's condition was so desperate that amputation was resorted to as a last resource on the eighth day, and he died soon afterwards.

The principal advantage claimed for the method is the absence of decomposition, and, therefore, the risk of septicæmia. This I have said is possibly due to its application, but quite as probably may be ascribed to free syringing of the parts with a weak carbolic lotion from a rather powerful syringe, together with improved air. Such is the practice I recommend and have pretty freely carried out in my own wards.

Other advantages claimed for it are that the amount of suppuration is lessened, and that the rapidity of healing and closing is favoured. Admitting that this is so, I say that independently of the carbolic treatment this is quite capable of being brought about by the mere apposition of the walls of cavities by bandages and strapping which form a necessary part of the carbolic acid treatment.

Skin Grafting.

It is scarcely necessary for me to detail the various cases of skin grafting that have occurred to me during the past year, but in every wound or ulcer of large size, where the patient does not object to have a small piece of skin taken from his own

arm, or where a favorable opportunity occurs for removal of a portion from a recently amputated limb, skin grafting is always employed, and, generally speaking, with the happiest results. At all events, if no good accrues, no harm results. The pieces of skin may be numbered by the dozen, and in one patient nearly thirteen dozen pieces were applied.

No dexterity is required in the insertion of the grafts. The best plan is to take a lancet and slice off a small piece of the superficial layers of epidermis, less than two lines in diameter, taking care not to pass deep enough to draw much blood. This should then be placed upon the wound, not too far from the edge, and retained in position by a small piece of plaster. This is the plan adopted by M. Reverdin, who kindly practised it on three or four of my patients during the last summer. The graft may appear to have failed in three or four days, but all hope should not be given up, for grafts sometimes revivify as late as ten days after insertion.

Fractures.

The following fractures were admitted between October 1st, 1871, and September 30th, 1872:

Fracture of skull, compound comminuted of vault		1
„ superior maxilla		1
„ inferior maxilla, comminuted		1
„ spine		1
„ sternum		1
„ ribs		3
„ humerus—		
shaft	3	5
external condyle into joint	1	
internal „ „	1	
„ radius and ulna, compound		1
„ pelvis		1
„ femur—		
impacted intracapsular	2	20
intracapsular simple	1	
impacted of neck outside capsule	1	
of shaft	16	
„ patella		2
„ tibia (1 compound and comminuted; 1 compound)		8
„ tibia and fibula (2 compound)		12
„ fibula		3
Fractured skull and femur		2
		62

The fracture of the skull was associated with much comminution of the fragment, which, however, could not be felt before an operation had been commenced. The bone was felt to be depressed and fissured, and for this reason the scalp was turned off the bones at the spot, and the depressed parts elevated; it was then found that the skull around was much comminuted, and six or eight small pieces of bone were removed by the forceps, leaving an elongated aperture in the skull.

The fracture of the superior maxilla was one of the alveolar process, it being bent backwards on the hard palate.

The fracture of the sternum promised to do well at first, though the patient subsequently left the hospital with much displacement of the upper fragment forwards.

Of three cases of *fractured ribs* all were associated with emphysema.

Of the *fractures of the humerus*—total, 5 :—

The right humerus was broken			at the upper third in 2 cases.
The left	„	„	at its middle in 1 case.
The right	„	„	about condyles into the joint in 2 cases.

The two fractures at the upper third were very oblique, and therefore difficult to retain in position. The fractures into the joint were both followed by some impairment of motion, though both promised to leave useful limbs under a regulated amount of passive motion daily.

The case of *fracture of the pelvis* is remarkable for the extraordinary damage done to the parts without giving evidence of its existence during life. The pelvis was fractured on the left side, across the ramus of the pubes; the pubic symphysis was separated without fracture for an inch; while the synchondrosis on each side was separated for three quarters of an inch, so that the sacrum was quite disjoined from its bony attachment on either side.

Of the *fractures of the femur*, four occurred about the neck, and sixteen somewhere about the shaft. Three of the four about the neck illustrated the difficulty that often exists in diagnosis in this class of cases.

They all had certain symptoms, viz. great pain, shortening, less than an inch in extent, eversion of the foot, and sudden loss of power to raise the limb immediately after an injury; and

yet within a fortnight after the accident they had recovered such an extent of motion as to render it doubtful if they could have received a fracture. Watching, however, the whole progress of each case, and the somewhat slower progress after the first fortnight, it still seems that the diagnosis was correct.

Of the sixteen fractures of the shaft of the femur six occurred on the right side and nine on the left. In one case there was fracture of both bones.

Thirteen of the sixteen were in patients under puberty. The seat of the fracture was in the upper third in two; in the middle third in seven; in the lower third in four. They were all simple fractures, and were all treated by extension with weights. The result of this treatment in each case is given in the following table:

	Age.	Situation of Fracture.	Treatment.	Result, as regards shortening.	Stay in Hospital.
1	$7\frac{1}{2}$ months.	At middle, both femurs.	2 lbs. to each leg.	Greenstick.	20 days.
2	57 years.	Middle.	8 lbs., increased to 10 lbs., and side splint.	1 inch.	64 „
		Fracture separated forcibly.	13 lbs. applied.	Rather shorter than left.	
3	8 „	Above lower epiphysis.	6 lbs. and side splint.	$\frac{1}{2}$ inch.	45 „
4	8 „	Junction of middle and lower third.	$4\frac{3}{4}$ lbs. and side splint.	$\frac{3}{4}$ inch.	46 „
	Simms' Charity, July 27.				
5	8 years.	?	7 lbs. and side splint.	1 inch.	39 „
6	7 „	Below great trochanter.	$5\frac{3}{4}$ lbs. and splint used.	$1\frac{1}{2}$ inch.	42 „
7	13 „	Ditto.	10 lbs. and side splint.	$\frac{1}{4}$ inch.	49 „
8	8 „	Upper third.	7 lbs. and side splint.	$1\frac{3}{8}$ inch.	49 „
	Esterby, July 26.				
9	$1\frac{1}{2}$ years.	Middle.	4 lbs.	Greenstick.	18 „
10	1 „	Ditto.	3 lbs.	Greenstick.	15 „
11	18 „	Ditto.	6 lbs.	Could not be measured on account of peculiar deformity of legs.	56 „
12	9 „	Lower third.	4 lbs.	Between $\frac{1}{2}$ and 1 inch. The amount could not be stated accurately, as the knee was flexed from old disease, and therefore no points of definite locality could be fixed upon below.	52 „
13	43 „	Below middle.	4 lbs. and side splint.	...	60 „
14	2 „	Above middle.	3 lbs.	None.	20 „
15	3 „	Middle third.	3 lbs.	None.	24 „
16	10 „	Middle and lower third.	4 lbs.	$\frac{1}{2}$ to $\frac{3}{4}$ inch.	47 „

The principle embodied in the treatment by weights is the tiring of the muscles of their spasm by a uniform, steady, and prolonged counterpull, maintained as the muscles relax, which compels the fractured ends of the bone to resume their normal relations, and the limb to be restored to its proper length. If the muscles are the only obstacles to a restoration of the limb to its proper length, the principle seems perfect, and must necessarily be an improvement upon the splint and perineal band, which at once puts on its maximum of extension, leaving the subsequent relaxation uncared for. But if it be allowed that the treatment by weights is in theory perfect, and yet under its application shortening is still present, it must follow that where shortening is, enough weight has not been used, that the muscles have never been tired, nor the complete relaxation of their fibres brought about. If not so, then we are driven back to challenge the first principle of the treatment, and are obliged to assume that muscular spasm is not the only or constant cause of distortion in fracture; and possibly in that case, so far as the shortening only is concerned, the old treatment is just as good as the new.

We will for a moment examine the table with reference to the point of inverse correlation between shortening and weight, and then take up the other point as to possible causes of shortening, apart from muscular spasm. Nine out of sixteen of the cases had more or less shortening; in seven of these the patients were children of ten years of age or under, four of whom had shortening half an inch in amount, with weights of 4, 5, $5\frac{3}{4}$, 6 pounds respectively. Two at eight years of age had weights of 7 pounds each; one got one inch shortening, the other one and three eighths of an inch. A child of eight years of age with $4\frac{3}{4}$ lbs. weight had three quarters of an inch shortening. A boy of thirteen, and a man of fifty-one, both had 10 pounds applied; the boy had one quarter of an inch shortening, the man one inch.

Now, was the weight applied in these cases, taking an average, sufficient to avert distortion? What says Mr. Erichsen? I quote from a lecture published in the 'Lancet,' 1868, vol. i, p. 584. He there supports the statements of Buck, the original introducer of this plan of treatment, and says, "In the majority of cases eight to nine pounds is quite sufficient, and in children

three to five is enough." With extension, then, sufficient, according to a standard authority, we have results certainly not in any great measure superior to those obtained in former days by the perineal band. We come, then, to this conclusion, that while excessive shortening is probably the result of muscular spasm, in many cases, and for which either of the above methods is equally applicable, there is a certain amount of distortion in most fractures of the femur determined not by muscular action, but by the special features of the fracture and surrounding parts, peculiarities which, whether of bone or periosteum, prevent the perfect coaptation of the various spicules in their proper crevices, and almost necessitate a certain amount of shortening. Such conditions we claim more or less for every fracture. The practical outcome of this is an important one for surgeons to bear in mind—that, as a rule, in fractures of the femur, some shortening may be expected; they may prepare their patient for it, and at the same time tell them little or no harm will accrue to the usefulness of the limb in the future.

But I would not dismiss the treatment of extension by weights thus depreciatively, though I maintain that for the mere shortening one method of treatment is as good as another; it still remains that the weights are by far more cleanly and comfortable to the patient, and by their means the sudden and enforced stay in bed is rendered less irksome and depressing. Need more be said to support their very general adoption?

Of *fractures of the tibia*, eight in number, five were on the right side, three on the left. Four of these occurred at the junction of the middle with the lower third; one was high up on a level with the tubercle of the tibia, and of the remainder in the lower third two were separations of the lower epiphysis of the tibia. One of these was compound, and the lower part of the shaft of the bone protruded for half an inch through the skin. It was a question as to the mode of treatment to be adopted, but the patient being a boy of 11, I decided against amputation, and in favour of an attempt to save the limb. The tibia was reduced through the skin after taking off a piece one third of an inch in length; the case was treated antiseptically. The satisfactory termination justified the treatment. The boy went on uninterruptedly well, and the parts all united after a somewhat prolonged suppuration. Subse-

quently a piece of necrosed bone had to be removed, but the patient left the hospital well six months after the accident.

Of the fractures at the junction of middle and lower thirds one was comminuted and compound, and, occurring in an unhealthy man, sloughing took place. Extensive incisions were made in the soft parts, and a piece of tibia $2 \times 1\frac{1}{4}$ inches subsequently removed. The man's leg, however, was saved.

Of the *fractures of the fibula*, three in number, two were on the left side, one on the right. They were treated, two on a Dupuytren's splint, the other one by a back splint, and ultimately with a stiff bandage.

Both tibia and fibula were broken in twelve cases, in seven on the right, in five on the left side. The fracture was situated in one in the middle third, in three at the junction of the middle with the lower third, and in nine in the lower third. Two of the cases were compound: in one of these Tinct. Benzoin. Co. was applied to the wound, and it healed up without further trouble; in the other very extensive suppuration occurred all about the leg, and to relieve this large incisions were made as soon as any pus could be discovered. By these means alone I believe the man's leg was saved. The fracture was a very severe one, and the patient fortunately a very healthy man, though a free liver.

Case 58.—*Compound Comminuted Fracture of left Tibia and Fibula; Extensive Suppuration; Free Incisions; Recovery.*

Isaac S—, æt. 38, a guard on the Tonbridge coach, was admitted May 29th, 1872. He was on the roof of his coach when the rail broke and he fell headforemost into the road, the left leg becoming doubled under him. He is married. Takes a good deal of liquor.

On admission.—The left tibia and fibula are fractured, the tibia obliquely from above downwards and inwards, the upper fragment being much displaced inwards, the lower outwards; over the neck of the tibia is a small oval wound from which oozes freely dark-coloured blood. The vessels of the foot pulsate normally. No other injury.

The limb was put up at once in back and side splints with a pad over the wound steeped in Tr. Benzoin. Co. The limb was swung.

May 30th.—Free oozing during the night. Pad kept in position.

June 1st.—No pain; some redness about the leg and knee Ice applied.

3rd.—Poultices applied.

4th.—The pad removed from wound. No discharge underneath. Surface granulating healthily, but the tissues around are boggy. T. 99·6°.

6th.—The wound was enlarged, and a piece of the shaft of the tibia, one and a half by one inch, which was quite loose, removed. It consisted of the whole layer of the external shaft of bone.

7th.—Wound further enlarged to the extent of four and a half inches to let out pent-up pus. A second incision, two and a half inches long, was made over the inner side of the tibia. Full diet; beer Oij; no wine.

8th.—P. 112; T. 100·7°. Takes his food well.

9th.—T. 98·4°; P. 112. Wounds sloughy and very offensive.

17th.—Free incision made over head of fibula to let out pus. An hour or so afterwards severe hæmorrhage occurred from wound, the patient losing, it was conjectured by his dresser, some fourteen or fifteen ounces. He fainted and had a slight convulsion.

19th.—Temp. 98·2°; P. 100. Dressings all removed, water dressing substituted. Patient's general condition is capital.

July 5th.—An attempt made, under chloroform, to get away some apparently dead fibula, but without success. From this time he mended quickly; the incision healed in great part, and he left his bed for a chair on August 9th.

20th.—He leaves the hospital. A sinus still discharges on the front of the leg, also over the head of the fibula. The fragments are in a somewhat bad position. Limb still retained on a splint.

Case 59.—*Compound Comminuted Fracture of Right Leg.*

Jonathan G—, æt. 56, a brewer's drayman, was admitted on April 5th. He slipped down on the pavement and broke his right leg; he then walked more than half a mile to his house, and ultimately came to the hospital in a cab.

On admission.—The right tibia is fractured at the junction of the middle with the lower third, and there is much swelling of the leg. The man looks as if he imbibed freely, but says that he cannot get more than three pints of beer per diem.

April 7th.—Extreme tension of the soft parts from blood extravasation. The limb was placed between sand bags in a pegged box.

23rd.—Back and side splints applied.

29th.—A sloughy-looking wound has formed, two and a half inches above the ankle, over the inner aspect of the tibia, from which a piece of bone protrudes. This was extracted after some force, and proved to be a piece of the tibia from just above the epiphysial expansion. It measured two inches by one and a quarter inches, and consisted of the whole thickness of the compact layer with a thin coating internally of cancellous tissue. A little sloughing and burrowing occurred afterwards, which soon ceased on a counter opening being made behind the leg, and from that time he did well.

On May 14th the splints were changed for a Dupuytren to the inner side of the leg, as the foot seemed inclined to turn outwards.

On July 6th the patient got up, and all splints were discontinued. He then got about on crutches and left the hospital on the 17th. He could bear a little weight on the heel, but could not use his leg much yet.

Case 60.—*Compound Separation of the Shaft of the Tibia from its Epiphysis; Carbolic Treatment; Cure.*

Robert F—, æt. 12, living at Marigold Street, Borough, was admitted January 16th, 1872. He was walking along the street, when his right foot slipped off the kerb, and a cab ran over the lower part of his leg.

On admission.—His right leg lies upon its outer side, with the foot displaced outwards. The outer side of the leg is grazed, the fibula being fractured between one and two inches above the malleolus.

The tibial epiphysis is separated from the shaft, and the end of the diaphysis protrudes through a transverse wound one and

a half inches long on the inner aspect of the leg; the protruding bone measures about half an inch. The anterior and posterior tibial arteries both pulsate below the seat of the injury.

January 16th.—Chloroform given, and an attempt made to replace the protruding tibia. This was unsuccessful, and the lower end of the shaft, about a third of an inch in thickness, was in consequence sawn off, after which the displaced bone was reduced.

The wound in the skin was adjusted by sutures under carbolic spray, and the parts were then covered up by protective and gauze; an outside splint was applied to leg and foot.

17th.—M. T. 104·1°; P. 120.

18th.—M. T. 102·6°; P. 112. Wound dressed; a little brownish pus, perhaps ʒj, was found under the protective; this was rather offensive. The skin over the exposed bone is sloughy-looking. Redness extends up to the knee.

19th.—M. T. 101·6°; P. 120. Offensive smell about the bed. To obviate this, carbolic oil on lint was placed over the dressings.

20th.—T. 102·9°; P. 120. Smell still offensive. Inguinal glands enlarged. Two and a half to three inches of the lower part of the shaft of tibia exposed and discoloured. Dressed to-day. An abscess opened in the calf of the leg, and a good deal of pus let out; pus offensive about the wound.

21st.—T. 98·4°; P. 112.

22nd.—T. 101·1°.

23rd.—T. 104·7°; P. 120. Very thirsty; leg looking well. No apparent cause for the excessive temperature noted this morning.

27th.—Leg dressed to-day. Roughly estimated, perhaps ʒss of pus has collected since the 24th. There is a peculiar odour about the bed, but no pungent offensiveness. Sores looking healthy; granulations rather weak.

February 5th.—Leg dressed; not much discharge; pus burrows up to upper third of calf. Opening was made at the upper part of the burrow. Tibia still discoloured about the ankle, but less white and dead-looking than it was; granulations are springing up over it; no offensive smell.

6th.—M. T. 99·4°; P. 128.

10th.—Much suppuration on the inner side of the leg. The

exposed tibia looks much more vascular, as if it would all be saved.

23rd.—Leg dressed; granulations have nearly covered in the bone; half by a quarter only exposed now. This is black (?) from necrosis or carbolism. A good deal of purulent discharge, which has a peculiar kind of offensiveness, not unlike that of pus confined by gutta percha dressings.

March 11th.—The leg has been dressed every other day since the last report. Tibia now completely covered in; fracture firmly consolidated, and the foot in good position.

26th.—Splint discontinued; got up.

April 8th.—External wound closed gradually; carbolism discontinued.

June 17th.—Two sinuses still remain over the lower end of tibia on the inner side; these were united by a semicircular incision, the tibia exposed, and a small piece of bone felt behind and on outer side of the tibia. To get at this, a good deal of the cancellous structure of the tibia was removed, and after a somewhat prolonged operation the piece was removed.

It appeared to be part of the external layer of the shaft of the tibia. He went on uninterruptedly well till July 24th, when he left the hospital.

August 13th.—Patient came to the ward to-day. A small fragment of bone came away at the early part of the week; the leg is now healed. Goes to Bognor.

Case 61.—*Disease of the Lower End of the Femur, implicating the Knee-joint; Amputation; Recovery.*

Arthur G—, æt. 38, a gardener, living at Gravesend, was admitted April 5th, 1872. Twenty years ago he first had an abscess about the right knee. It occurred on the inner side, just above the joint. Much pain was felt at the time, and he was unable to walk, and eighteen months elapsed before the opening which formed had quite healed up. From this time till six years ago he had a perfect leg, and could walk with it just as well as with the other.

Six years ago pain was again felt in the joint, with impaired motion; this without any blow or other known injury.

Since then abscesses have formed five different times and four

times have healed up again, the last abscess remaining open now. With each abscess (all of them have formed exactly at the same spot) stiffness of the joint has been felt; while with the subsidence of each attack the motion of the joint has become perfect again.

Eight or nine weeks ago the last abscess formed, and it has been discharging for five weeks. For this period he has been unable to walk on the leg.

On admission.—The right knee-joint is flexed to an angle of 110°, and cannot be further straightened. It can be flexed slightly, but hardly any motion is perceptible in the joint. No displacement of bones and no abnormality of heat. A little, but not much, fluid exists below the patella. Circumference of the joint fifteen and a half inches, circumference of left knee not fourteen inches. No pain on manipulation of the joint. The shaft of the femur is thickened above the joint, and two inches above the condyle is a sinus with bone-characteristic granulations protruding.

The patient is much wasted, but has no cough; chest sounds normal; abdominal dulness normal.

A probe runs up the thigh for one and a half or two inches, and also down towards the femur, but no bone can be felt.

An examination was made several times, but no dead bone could be felt.

On April 27th chloroform was given, and the knee straightened and fixed on a back splint. This caused some increased heat about the joint, and in a few days pus began to burrow in the popliteal space.

May 24th.—Temp. 101, pulse 104. The joint cavity is now distended with fluid. He has pain on the least touch, and pus now burrows from the sinus, both up and down the calf, and into the popliteal space.

Under these circumstances, the man not being in a state to undergo any prolonged effort of repair and suppuration, the limb was amputated on May 28th. Lateral skin-flaps were made and the vessels twisted. Eight and a half inches of the femur were removed.

State of parts.—The femur, which was the seat of the original disease, had a thickened periosteum to within half an inch of the line of removal. Underneath this, on the external layer of

the shaft, new bone had formed, of a line or more in thickness, down to the condyles.

A section of the bone showed the cancellous structure to be obliterated through its whole thickness, from the condyles upwards to the extent of the parts removed. The surface of the section was smooth, uniform, and of a yellowish bony character. New bone had apparently filled up the cancellous structure, and made the tissue, in place of being porous, dense. This new bone had not, however, succeeded in keeping up its vitality, the whole being yellowish and degenerating, with small cavities in it containing a purulent fluid. No line of separation existed between degenerated new, and the healthy original, bone. The two merged imperceptibly one into the other.

The knee-joint had a vascular synovial membrane, and was gelatinous in the angles free from pressure. The cartilages were eroded over the inner condyle and inner head of the tibia, and slightly elsewhere, but to no great extent. A little pus was found in the joint, and the external sinuses communicated with the joint cavity.

The after progress of the case leaves little to be said. The temperature the day after the operation was 98·8°, and it never went beyond 99·7°, and was normal again on the seventh day.

Hardly any suppuration occurred, as may be concluded from the fact that the stump had healed in great part on the eleventh day.

He got up on the twenty-first day, and left the hospital with a soundly-healed stump on the twenty-seventh day after the operation.

Case 62.—*Disease of the Knee-joint; Amputation; Recovery.*

Arthur S—, æt. 16, was admitted on March 6th, 1872. His family is a healthy one, and he himself was a healthy boy till two years old, when he fell down and struck his knee against a door. The joint became swollen and bruised, and he has never walked on the limb since. A year afterwards an abscess formed, which opened and discharged for some time, and fresh sinuses have formed lately.

On admission.—The right knee-joint is acutely flexed, with some dislocation backwards of the tibia off the condyles. The joint is larger than that of the other side, which cannot be accurately measured because of the flexion and tension of the hamstrings. No fluid exists in the joint.

The fixity of the patella was not ascertained, but much pain was complained of when pressure on it was attempted. Some tenderness seems to exist about the condyles of the femur. No marked eversion of the foot. Some sinuses exist round the joint, and there is an impetiginous eruption over the surface.

For a fortnight before the operation he complained much of pain, and the temperature was slightly above the standard of health.

The limb was amputated on the 26th March. Temp. before operation 99·4°, pulse 100. The vessels were twisted, and the flaps adjusted by sutures. No 'carbolic' precautions were adopted.

Description of the parts removed.—The joint cavity is obliterated, being filled up by fibrous and fatty material. The cartilages, though somewhat ecchymosed, are not obviously diseased. The crucial ligaments are unaffected. A section of the bones shows the disease to be confined to the epiphyses, both of the femur and tibia, the latter bone being more diseased than the former. The tibial epiphysis, half gone, contains a cavity immediately beneath the cartilage, filled with curdy-yellow material, while the rest of the epiphysial bone is of an opaque yellow. The femoral epiphysis is of an opaque yellow, also with a smaller cavity beneath the cartilage, like that existing in the tibia.

The subsequent daily history need not be detailed. The temperature remained high for eleven days, with a pulse over 120, but from this time both fell to normal, and with the exception of a small abscess on the left side of the stump, slightly retarding recovery, the parts gradually healed.

He left the hospital well on May 9th.

CASE 63.—*Amputation through the Leg; Previous Excision of the Astragalus; Lardaceous Disease.*

Emily T—, æt. 6. This case was originally one of disease of

the astragalus, and that bone was excised, as reported in the 'Guy's Hospital Reports' for last year. The patient had a useful limb when she left the hospital, though still but feebly repaired. She was re-admitted on June 7th with the whole line of incision across the instep studded with apertures leading to sinuses in the cicatrix; these had sloughy-looking edges, but the probe passed along did not lead to any bare bone. The foot was placed on a back splint, and she was kept in bed for some months; the wound kept discharging, and she then got enlargement of the liver and slight albuminuria; the foot remained almost *in statu quo.* Under these circumstances, though no dead bone could be found, it was determined to amputate the foot.

State of parts.—The bones had a grumous red marrow in them, but appeared otherwise healthy; the cartilage still existed on the articular end of the tibia and also on the os calcis. These two bones were lying close in apposition, separated only by an interval of two lines which was filled up by obliquely disposed fibrous bands running between the os calcis cartilage forward to the tibial cartilage. Part of the surface of cartilage on the os calcis seemed to have been absorbed, as it was irregular, but not so on the tibia; the fibrous material appeared to be directly continuous with the cartilage in one layer. The sinuses in the cicatrix led directly into the interval between the bones, but no dead or carious bone was found anywhere.

The state of the child after the operation was the exact counterpart of that prior to it, but whereas after the excision her condition, which may be well described as actionless, had proved exceedingly harmful, inasmuch as granulating processes were necessary, it was certainly beneficial now that only adhesion of surfaces was required. The two flaps simply adhered, no heat of parts ever occurred, no suppuration. No higher temperature than 100° in the axilla, and the stump gave no more evidence of action the day following the operation than it did seven days after, when the parts appeared to have fairly consolidated. She complained for some time of pain in it when touched. The poor child is, however, now the subject of advanced lardaceous disease of the abdominal viscera.

CASE 64.—*Disease of the Tibia; Amputation through the Leg; Torsion; Secondary Hæmorrhage; Death.*

Anne A—, æt. 54, a dressmaker, was admitted on July 4th, 1872. Is a single woman and has always had weakly health. She has never had rheumatic fever, and is not subject to cough. Thirteen years ago she felt pain in the right ankle, and this continued on and off for six months. Then an abscess formed on the inner side of the joint, which opened and has never healed up since.

Six years ago she had some bone removed, and remained in the hospital three months. She has walked on a wooden leg and used crutches since, but the leg has not healed, and during the last two months the foot has got rapidly worse. The last week the pain has been intense. A good deal of discharge has taken place from the leg on and off throughout the course of the disease.

On admission.—She is a spare and rather pallid woman, with a bad appetite.

The right foot is in the following state:—The ankle is swollen anteriorly immediately in front of the fibula, but not elsewhere externally; on the inner side, over the malleolus, is a transverse opening discharging fairly healthy pus. The hollow round and below the malleolus is, in this instance, obliterated by a large fluctuating swelling. A probe passed into the existing opening goes down to bare bone. The pain is so severe on moving the foot that no complete examination can be made, but, as far as can be ascertained, the bones are not affected in front of the ankle.

The limb was elevated in bed and water dressing applied.

The pus round the ankle made its exit by the wound, and she was then considerably relieved.

On July 9th the parts were examined carefully under chloroform. Plenty of dead or bare bone was felt in the direction of the joint, and the probe passed nearly to the other side. Under these circumstances amputation of the foot was performed at the junction of the middle with the lower third of the leg. Considerable difficulty was experienced in twisting the vessels, but

they were ultimately secured, and sutures were inserted to keep the parts *in sitû.*

Examination of limb.—The outer surface of the internal malleolus was bare, black, and carious; from thence the probe passed into a cavity in the lower end of the tibia, and a section of the bone showed that this cavity was confined to the malleolar part. Here was a small cavity with black and sloughy looking contents, which communicated with the ankle-joint by an opening half an inch long. The probe passed from outside into the ankle-joint, but the communication with the joint must have been somewhat recent, as there was an absence of all signs of inflammation or disease of the joint, except what was indicated by the removal of a very superficial layer of cartilage in places. One had to look indeed carefully to make out any disease in the joint at all, notwithstanding the opening into it which clearly existed.

1st day.—Has felt sick, but has not vomited. T. 103°. P. 104.

2nd day.—Stump dressed. T. 102·2°. P. 112.

3rd day.—T. 101°. P. 104. The temperature kept up to 100° for six days, and a good deal of sloughing occurred, exposing the ends of the bone.

6th. day—Lot. Acidi Carbolici and Lot. Opii partes æquales to stump.

8th day.—Passed some *black urine* this morning. In all other respects she is well; the stump looks more healthy. Lotion continued.

9th day.—Flushed. T. 98°. P. 112. Still passing black urine.

13th day.—T. 100°. P. 120. Extension of suppuration up the leg between the bones. Pressure on this part started some large artery bleeding. A large slough of fascia seven or eight inches long was afterwards extracted. Fresh bleeding occurred in the afternoon, but was easily arrested by pressure.

Fresh hæmorrhage occurred on the fifteenth and seventeenth days, and amputation above the knee was in consequence performed by Mr. Howse. The patient died on the evening of the seventeenth day.

On examining the stump removed, and injecting water gently into the popliteal artery, a full stream issued from a large trunk behind the interosseous membrane. A further dissection showed this to be a large peroneal artery, which gave the main supply

to the limb; the posterior tibial being but small in this instance. The peroneal artery was lying with a perfectly patulous mouth deep in the flaps. The posterior tibial was closed, but only very insecurely, and no clot was found on either vessel above the opening.

The muscles were extensively degenerated and pale nearly up to the knee.

Amputations.

Cases 61—64 constitute four among eight amputations that have been performed during the year, and which are summarized in the following table:—

Sex.	Age.	Duration of disease.	Amputation.	Result.	Period after operation.	Remarks.
F.	20	15 years	Thigh	Recovery	50 days	—
M.	23	6 months	do.	do.	39 days	—
M.	22	2 years	do.	Death	10th day	—
M.	29	1 month	do.	do.	7th day	—
M.	38	20 years	do.	Recovery	27th day	—
M.	6	4 years	do.	do.	44 days	—
F.	6	Many months	Leg	do.	17 days	Advanced lardaceous disease.
F.	54	13 years	do.	Death	17th day	Secondary hæmorrhage on 13th day after extensive sloughing.

Of these cases four have been already published in the 'Lancet,' vol. i, 1872. Those given here in detail,—two of the thigh and two of the leg,—demand a few words of comment. Case 62, a child whose astragalus was examined and reported on in last year's volume, came in again, the wound having broken open. After a short stay in the hospital she became the subject of lardaceous disease. The interest in the other case consisted in the cause of death, which was secondary hæmorrhage. Of course in all cases in which hæmorrhage has had to be restrained in bleeding vessels torsion, as is usual, has been employed. It is now nearly five years since I have applied a ligature for the arrest of hæmorrhage, and this is the first case where bleeding has occurred after torsion. The same thing, however, took place twice after acupressure, and I have seen it where ligature has been applied. In all these methods the same condition of artery has been

found with the hæmorrhage, viz. an atheromatous condition of the coats. It does not follow that because atheroma exists torsion should not be employed; on the contrary, I have in one or two instances twisted an atheromatous femoral artery and no bleeding has afterwards recurred. At the same time it cannot be denied that it may come on after torsion as well as after ligature, and I see no loss if that be the case in adopting the treatment one habitually follows, viz., torsion, in all instances. In this case there is no doubt that the immediate cause of the hæmorrhage was sloughing, extending up the leg underneath the skin, laying bare the artery, which subsequently gave way.

Synopsis of Cases recorded in the Present Paper.

REMARKS

ON

DISEASES OF THE NERVOUS SYSTEM.

WITH CASES.

By SAMUEL WILKS, M.D., F.R.S.

I. Terminology.

It is remarkable that the rough nomenclature framed in the earlier days of anatomical knowledge should still hold a place in our medical literature, rather than a system founded on the physiological basis which is accepted at the present time. We are still using the expressions "cerebral" and "spinal" nerves, and as regards the former we are scarcely advanced beyond a method which places a nerve in a numerical list comprising within it the special senses. The terms "cerebral" and "spinal" paralysis, founded on this anatomical division, are still in use, although they have little meaning in a pathological or clinical sense. It might be said that, though incorrect, they are not calculated to mislead, since the true function of the centres is agreed upon; but this is not so, for I have found that these inexact expressions not only govern the minds of students, but lead astray those who are better informed.

It must be remembered that our physiological knowledge of the cerebro-spinal centres is tolerably well defined and correct as far as it goes, and that there is no reason why we should not make use of this knowledge rather than be hampered by effete expressions founded on the cruder observations of former times. I am

now alluding more particularly to the anatomical division into brain and cord, together with the nerves which spring from them. This division was made dependent upon the corresponding separation of cranium and spinal column which held these organs; the nerves were likewise cranial or spinal, according as they proceeded from one or the other. If either of these sets of nerves had lost their function, so the terms cerebral or spinal paralysis were adopted.

Such expressions as these, at the present day, are obviously incorrect, and it were, therefore, to be wished that some other terms, more in accordance with our physiological knowledge, could take their place. The anatomical division of the nerve-centres above mentioned is of no value to us in questions of pathology and clinical medicine, but rather the physiological, which is framed on principles altogether regardless of the part of the osseous skeleton in which these centres are placed.

Physiologists are agreed pretty closely as to the distinction between brain and spinal cord, and, therefore, physicians who are treating the diseases of these organs should follow their method. They speak of the spinal cord as composed of a congeries of nerve-centres from which nerves spring, and also of strands of fibres passing upwards and downwards for the transmission of sensory impressions and motor acts. The whole of the sensory and motor nerves being connected with the spinal cord, any disease or injury of the latter would produce paralysis of some part of the body; and, on the other hand, every form of paralysis would denote a lesion of the spinal cord. I am, of course, here excluding the nerves of special sense with their own perceptive centres. Physiologists would then speak of a large mass called the cerebrum, which covers and encloses the upper part of the spinal cord, which cerebrum receives impressions from all parts of the body, as well as from the special senses, converts these into perceptions and mental processes, and develops a volitionary power which affects the cord below, and through this the body at large. There are, therefore, no cerebral nerves, and disease of the brain cannot produce paralysis. The latter is caused by changes in the spinal cord, whereas disease of the cerebrum produces delirium or dementia. It seems, therefore, remarkable that this intelligible division made by physiologists of the

nerve-centres into the brain and spinal cord should be so often forgotten, and an older one framed on an anatomical and exploded method still be followed, which tends to mislead those even who possess a better knowledge. At a former period it was supposed that all that was contained within the cranium was brain, and all that was contained in the spinal column was cord, and thus the nerves arising from the former were cerebral and those from the latter spinal; but now that the cranium is recognised as being formed of developed vertebræ and containing the upper portion of the cord, all terms founded on such erroneous views should be expunged. Sir Charles Bell long ago saw that the cranial nerves were like in all respects to the spinal, and were attached to the upper parts of the same columns. This view necessitated the idea of the prolongation of the cord into the cranium. But we know even more than this, that it is not the nerves to the head only which proceed from the intra-cranial portion of the cord, but that the nerves of the limbs are intimately connected with that portion which is enclosed within the skull. It is now taught that the motor and sensory tracts of the cord are prolonged through the foramen magnum, and terminate in the cerebral ganglia. Little more is known of the function of these bodies than that, when diseased, they cause paralysis of the limbs. It is found, then, that any alteration in the structure of the cord, from its summit in the central ganglia to the spot where it ends in the cauda equina, produces a paralysis of some part of the body, and, on the other hand, that every form of paralysis necessitates an affection of a nerve or of the cord from which that nerve proceeds. All paralysis is, therefore, spinal, and cerebral paralysis (using the term paralysis in the ordinary sense) is a misnomer, there being no cerebral nerves. If the term paralysis be applied to the brain it should express loss of function of the brain proper as denoted by intellectual changes. If all which I have said be acceded to as correct or, perhaps, as a simple truism, then I have merely to remark that the sooner we are rid of the terms cerebral and spinal paralysis the better for practical medicine.

It is probable that these terms have given rise to much needless altercation in the discussion of pathological conditions, and it may be that the diversity of opinion held by Dr.

Marshall Hall and Dr. Todd, with others, in reference to the effects of galvanism in different forms of paralysis might have had its origin in the vagueness of such expressions.[1] The statements of Dr. Marshall Hall (whose fame should be coequal with Harvey's, since he made a discovery whose application is as wide as creation itself) were perfectly intelligible, and, I believe, irrefragable. He had demonstrated that the spinal cord was something more than a mere strand of nerves, proceeding to and from the brain; it was a distinct organ in itself, and, consequently, when separated from the brain its function remained. He not only showed the well-known experiments of reflex action, but that the cord exerted a direct influence over the muscles of the body; that if the cord were severed from the brain the body would be uninfluenced by the will and be paralysed, and at the same time the tone and contractile power of the muscles would be preserved, whereas if the spinal cord were destroyed the muscular tone would be lost. In his own words on the decapitated turtle—"The limbs or tail possessed a certain degree of firmness or *tone*, recoiled on being drawn from their position, and moved with energy on the application of a stimulus. On withdrawing the spinal marrow gently out of its canal all these phenomena ceased. The limbs were no longer obedient to stimuli, and became perfectly flaccid, having lost all their resilience. The sphincter lost its circular form and its contracted state, becoming lax, flaccid, and shapeless. The tail was flaccid and unmoved on the application of stimuli." The same phenomena would be present in the human subject in the case of severance or disease of the spinal cord. If the cord were simply divided, sensation would be lost and power of voluntary movement destroyed, whilst reflex action would be exhibited on the application of a stimulus; but if the cord itself were destroyed the muscles would lose their tone, and cease to respond to the stimulus. Dr. Marshall Hall stated that they would not then contract under the use of galvanism, which they would freely do when the cord was entire.

It is not yet positively ascertained to what extent this is true,

[1] The want of agreement in the results of the experiments might have been due in part, as Dr. Russell Reynolds has suggested, to their use of different forms of galvanism.

but that it is mainly so has been admitted by subsequent observers, especially if the experiments are made with the continuous current, since the exact effects of Faradization on the muscles totally dissevered from the cord are still the subject of inquiry. Dr. Marshall Hall would have said when his turtle was decapitated that it had cerebral paralysis, and when the cord was destroyed spinal paralysis. In like manner he used the latter term in the human subject when a paraplegia depended on disease of the cord; but if the paralysis arose from a mere severance of the cord from the brain, as would occur from a clot of blood or softening in its upper part, he styled it cerebral paralysis.

These terms are obviously wrong, though used to this day; they, however, denoted different pathological conditions, and consequently different effects were elicited from experiments on the muscles. His cerebral and spinal paralysis meant the cases respectively of the line being merely cut between the brain and the cord, or the line being altogether destroyed. The cord in one case is separated, in the other wanting. His statements, I believe, are quite intelligible, and the disagreements due to the obscurity of the terms cerebral and spinal paralysis. Dr. Marshall Hall himself, however, did not seem clearly to appreciate the fact that the motor and sensory tracts of the cord had their origin and termination in the central ganglia of the brain, and that thus a hemiplegia arising from disease in the corpus striatum or thalamus opticus was a true spinal paralysis. This is a subject I have especially dwelt upon in previous papers, showing how the separate action of the limbs necessitated a division of the cord into two halves, and how this had determined, in like manner, the division of the brain into two hemispheres for the regulation of each.

All paralysis, therefore, is spinal, and when the brain is affected there is no paralysis. I except, of course, those debateable instances where an arachnitis has, by an interference with the volitionary powers, been accompanied by a want of movement in a limb, and thus has simulated paralysis. The fact above mentioned, however, is often forgotten, and we repeatedly hear an expression of surprise when an abscess or tumour has been discovered in the brain and no paralysis has been present. The latter could not occur, or if it had been

observed it would have shown that the tumour had escaped from the cerebrum proper, and had involved the motor tract, the ganglia, crura cerebri or medulla oblongata.

If the brain, especially its cineritious part, is employed in various mental processes connected with perception, volition, and thought, we can understand how an inflammation of the surface will produce delirium, and how a chronic disease of the same will end in dementia; but it would be difficult to predicate the effects of a partial disease of the brain, as seen in a local softening, or an abscess, or a tumour in one of the hemispheres. The presence of such disease might cause a derangement of the brain, indicated by some mental disturbance, vertigo, sickness, or such like symptoms, but these would be insufficient to warrant any more definite diagnosis of the case than that of "cerebral." It may be stated, therefore, that local diseases of the brain are but rarely diagnosed, and we can understand the constant expression of surprise when a tumour or abscess has been found in the brain, and so few marked symptoms are present. If in such a case a paralysis of any kind had existed it would have only shown that a part of the spinal system was involved. When it is said that there is an absence of special symptoms I except the convulsions due to irritation of the surface, and what has been shown by Dr. Hughlings Jackson with regard to the condition of the retina. It is the very absence of paralytic symptoms which obliges us to place our nerve disease in the brain proper, and the grouping together of such vague symptoms as I have already mentioned, viz. strange sensations, dizziness, failure of memory, inability of mental effort, disturbed stomach, &c., although these even may be wanting if the disease of the brain is circumscribed. The very indefinite nature of the symptoms is indicative of disease of the brain proper, whereas a failure of muscular power, as shown by paralysis, would indicate that the disease had advanced beyond it.

If, then, we take the brain and spinal cord, as described by the physiologist, with their corresponding functions, and conclude that either the one or the other is diseased as these functions are affected, our nerve pathology is much simplified; but if, on the other hand, we speak of brain and spinal cord

as the older anatomists did, in reference solely to the bony case in which they were held, we involve ourselves in difficulties of our own making. When, for example, I turn over the pages of the journals and I find that a child having paralysis of the leg is said to have a cerebral affection, it is an expression without meaning. He may have had convulsion or some other symptom denoting an affection of the brain proper, but the whole of his disease, which is denoted by paralysis, signifies disorder of the spinal cord or of the nerves. It is true that difficulties arise where the whole of the intracranial contents are affected, as then both cerebrum proper and the upper portion of the cord are involved; for it may be remarked that some forms of disease of the cerebro-spinal centres are apt to spread; a morbid action proceeding from the central ganglia may soon reach the surface, or, perhaps, what is more common, a morbid change commencing on the surface spreads through the radiating fibres of the hemispheres until it reaches the central ganglia. Thus it is that a general paralysis, both of mind and body, is so often met with as the result of a variety of diseases of the nervous centres.

II. Pathological Connection between the Nerves and Cerebro-spinal Centres.

The subject of the pathological relations of the nerves with their centres is one awaiting further inquiry. It has often been surmised by writers that, owing to the direct communication between them, a peripheral portion of the body might be affected from the centre, or, on the other hand, the centre from the periphery, entirely through nervous agency. We have, I think, sufficient facts before us to warrant the assumption that this propagation of morbid action is more common than is usually supposed. We have the direct experiments of Waller, who shows that in consequence of the division of a nerve it rapidly degenerates throughout its course, and we are constantly meeting with cases of diseases and injuries of the spinal cord in which a most rapid morbid action runs along given tracts of its substance; consequently we have only further to show how these pathological changes may be transmitted from

cord to nerve and *vice versâ* to open out an interesting and almost new field of inquiry. In progressive muscular atrophy, whatever view we may take of its pathology, and whether we regard it either as a primary peripheral or as a central disease, we observe that, together with a marked wasting of the motor nerves both in their course and at their roots, there is a corresponding atrophy of the anterior columns of the spinal cord; also in locomotor ataxy combined with the change in the posterior columns there is often a corresponding chronic change in the nerves which proceed from them. There have been several observations made by the French physicians in reference to these secondary changes in the nerve centres; thus, Bouchard has shown how in some instances of softening or effusions of blood into the central ganglia of the brain an inflammatory or other morbid state has quickly travelled down the cord on the same side as far as the dorsal region, and Charcot has even stated further that the nerves of the brachial plexus in consequence of central disease become chronically inflamed and thickened, and in this manner explains some forms of contraction of the limb met with in paralysis. It has also been observed by Vulpian that after amputation of a limb the part of the cord which supplies nerves to it undergoes an atrophy, especially in the posterior columns and cornua. Several cases have been recorded where together with a congenitally wasted limb the central ganglia have also been found atrophied, as if there was some more intimate connection between the nerves of a limb and a centre than could be accounted for simply on the grounds of want of use. I might also allude to the facts of ascending and descending neuritis of the optic nerve in connection with inflammation or other affections of the brain. It is therefore reasonable to suppose that a more intimate connection exists structurally between the nerves and their centres, and that pathological processes are more frequently propagated from one to the other than is thought of when cases of disease of the nervous system are before us. One is obliged to speak in the vaguest terms of pathological processes, since the various morbid alterations which the centres undergo have yet to be discovered. We recognise various inflammatory changes giving rise to new products and alterations in the texture of the tissues, but we are

daily seeing cases where every form of nervous affection is present and yet where recovery takes place, and we see other cases of manifest disease of the brain and spinal cord ending in speedy death, and yet no morbid change discoverable by the eye or the microscope. We occasionally meet with cases where a weakness commencing in the legs rapidly passes upwards until in a few hours a complete paralysis of the whole body has occurred, and yet where an examination of the spinal cord has hitherto failed to reveal any alteration. The disease is so rapid in action that I always bring before my mind's eye a slow consumption of the cord, as is seen in a piece of touch-paper when the spark is placed to its edge.

In cases of general paralysis of the insane it sometimes happens, as I have myself witnessed, that in a few months a person of intellectual activity and good physical powers has become perfectly inert in body and mind; the function of both brain and cord has departed and death has inevitably ensued; yet the pathologist has failed to discover any morbid change in the nerve centres, which must without any reasonable doubt have been intimately altered in a case of this kind. These instances sufficiently prove that morbid processes in the nerve-centres are of different kinds, which may be only another mode of saying that the different component tissues are separately affected. In one case it may be the vascular, in another the neuroglia, whilst in a third it is the true nerve element itself which undergoes this rapid and remarkable alteration. The observations above mentioned tend to throw a light upon the painful contraction of the limbs which occurs a few days after a paralytic attack, and for the permanent contraction and wasting which is often met with in chronic cases of hemiplegia. If in the latter case the cause be due to cirrhosis of the nerves, it explains the inutility of galvanism and other treatment.

The converse case to this is the one of most practical interest, the propagation of disease from the nerve to the centre, a condition which obtains according to Cruveilhier in progressive muscular atrophy. In an example of this kind, however, the proof is wanting, and we must rather take cognizance of cases where as a result of injury the nerves in a limb have been the subject of an inflammatory process, and

the latter has extended to the spinal cord. By a collection of such cases something like certainty may be found. I alluded to a supposed case of this kind in the last volume of the 'Guy's Hospital Reports,' where a lad under the care of Dr. Barlow received a severe injury to the arm which rendered it useless, and who subsequently had paralysis of the other arm and then of the leg until the whole body was paralysed. After death there was found a chronic inflammation of the spinal cord. In this case there was the objection that the same accident which caused the injury to his arm might have affected his spinal cord, and that the disease had its origin in the medulla itself. Herein lies the difficulty. A man lately was admitted into the hospital for paralysis of the left arm, which had been gradually coming on. It was treated as a local affection, but soon afterwards his other limbs became affected until the case ended in a general paralysis. In such a case we can only surmise whether a primary spot of disease in the cord caused the paralysis of the arm, or whether the latter was due to the affection of the nerve which gradually crept up to the cord. In a case I give below of a young man there had been weakness of the right leg for two years which was attributed to a fall from a horse, and at the end of this time the arm became affected as if the disease were creeping up the spine. In the second case which I have been able to watch for some years the original mischief in the arm occurred independently of any fall which might have injured his spine, and therefore I have always considered the paralysis of the legs which followed as highly suggestive of a secondary affection of the cord.

In connection with a wasted limb I have in a few cases noticed the occurrence of epilepsy, and I cannot but think the association is more than a coincidence. In simple epilepsy there is no paralysis, any weakness of a limb occurring during the fit being only temporary. If the epilepsy, however, be due to organic disease in the brain as in syphilitic eclampsia, a paralysis may accompany it and sometimes be permanent. In such cases there is a gummatous deposit on the surface of the brain extending into its substance, and both the fit and the paralysis own a common cause. In the cases to which I refer it was probable that the limb was affected before the

occurrence of the fits, and as in one case there was pain on one side of the head, and in both the weak arm was most convulsed, there is reason to think that the half of the brain in connection with the fibres of the weak arm was most affected.

Case 1.—A. B—, æt. 25. About three years before I saw him, and whilst in India, his right leg began to get weak, and the weakness has been gradually increasing until at the present time the limb drags slightly whilst walking. The cause of the weakness is obscure, he had had two severe falls from his horse, and about three months before the weakness was observed had had an attack of fever. About a year ago he found his right arm becoming weak, and the want of power has slightly increased.

When I saw him he appeared in good health, and it was only by testing his strength that the right arm was found weaker than the left, and in walking it was observed that the right leg slightly dragged.

Case 2.—A gentleman, 55 years of age, has been obliged to retire from his profession on account of paralysis of the right arm and leg. He drags his leg when he walks, and his arm shakes so that he can only write with difficulty. There is no paralysis of the face, and the intellect is natural. The case is regarded as one of hemiplegia by his friends, but the history is altogether peculiar. About twelve years ago he struck his right arm, an abscess formed above the elbow which was opened and found to reach the bone. As it healed the soft parts became matted together, which prevented him flexing it well; it became at the same time weak and shaky, so that he never could use it as before. Between two and three years after this his leg became weaker on the same side, and at length he walked with considerable difficulty. He now drags his leg and has little power in the arm. The face quite unaffected.

Case 3 (reported by Mr. C. Knott).—Alfred S—, æt. 28, a clerk, admitted under Dr. Wilks, April 27, 1872. No history of hereditary or acquired disease. Fifteen years ago

he had a fall from a tree and was much injured about the body; he had the right hip broken and left forearm. He was laid up for some months and the left arm became stiff and weak.

He was well up to fifteen months ago, when, some days after travelling to London on a very cold day, he was seized whilst lying in bed with a cramping pain about the region of the seventh cervical vertebra. He attempted to get out of bed, when a pain went down his back like an electric shock. He managed to get into bed again after much trouble, and lay there until the morning, when he rose quite well. At breakfast he was stooping down, when he became faint and fell under the fire-place. He did not lose his senses. He then finished his breakfast and went about his work. During the day he found he was losing power in the left hand, every finger being affected, and he kept constantly dropping a small bag which he was carrying, and by the middle of the day had lost all power over his hand, and he noticed also that his left leg seemed to drag, so that he constantly stumbled, and he thinks his face was slightly drawn to one side. He was thus completely laid up for nine weeks. He gradually improved under the use of bromide of potassium and returned to business. About five weeks after this his affected arm became suddenly drawn up and he fell off his stool. The doctor who then saw him said he had had an epileptic fit. After this there was slight improvement in his arm and leg; he did not have another fit for four months, then another in two months, then more frequently, until lately he has had three in one day.

On admission.—He did not look ill, countenance bright, able to walk about, but dragged left leg slightly, left arm contracted and flexed, with little power of movement. Pelvis had large bony mass, growing from the seat of injury. Soon after admission he had a fit which was of a severe epileptic character, the convulsion was general, but the left arm the most agitated; on moving the arm the convulsions seemed to be increased. Complete coma, pupils dilated. In evening another fit. Ordered Potass. Bromid. gr. xv. He had no return for six weeks, when he had another attack, then no more for some weeks, and he left the hospital.

Case 4.—M. K—, æt. 24. Since the age of fourteen has had epileptic fits, more especially at the catamenial periods. She has slight warning by an aura proceeding up the left arm. Sometimes the attacks are slight and with no loss of consciousness; at other times she has had fits with convulsions. She has more or less headache, especially over the right brow. Her left arm is contracted and withered. This wasting has come on since the prevalence of the fits, but even before, when she was a child, the arm was, she thinks, weaker than the other. She took bromide of potassium for some months, and the fits were kept in abeyance. They then returned as before.

3. Spasmodic Affections.

I have said that there is scarcely a nervous disease having an organic cause but may have its counterpart in a functional one, and be cured by galvanism or other means. I must make an exception in regard to contraction and spasmodic affections of muscle. These diseases, in my experience, constitute the most difficult to explain or to treat in the whole domain of clinical medicine. The physiologist has not yet determined the true relation of muscle to nerve, for we have on the one hand evidence of the power of contractility in the muscle when separated from the nerve,[1] and, on the other hand, there is the fact of the muscle losing its tone in paralysis, as seen in the muscles of the face when the portio dura is affected, and in the experiments of Marshall Hall already referred to. If the dropping of the muscles of the face argues want of nerve influence, and the falling of the head in sleep the same fact, how are we to regard the case where a muscle is kept in undue contraction? An over nerve stimulation would be the most reasonable answer, for if the muscle relaxes when we become unconscious in sleep, we are bound to

[1] The contractility of muscle by direct excitation is constantly observed in the living subject when percussion is made over it, as in the pectoralis or trapezius. This was pointed out many years ago by Dr. Stokes, and is more constantly met with in phthisis, owing to the greater liability of consumptive persons to be percussed. It is not peculiar, however, to this disease, and is observed in the wasting of cancer and other disorders.

believe that we are sending a stronger volitionary force through the nerve, when by a voluntary effort we cause it violently to contract. In poisoning by strychnia we say the tetanic convulsion is produced by an over excitation of the cord. We suppose the same occurs in tetanus, and in the convulsion produced by the irritation of a peripheral nerve. In tetanilla there is a paroxysmal excitation of the cord. In epilepsy it is the summit of the cord in the central ganglia which is thrown into excitation, and if the cause be an evident one it is found to be an irritant on the corresponding surface of the brain. If a tetanic condition be owing to an evident and tangible cause, this is found to be an acute meningitis of the spinal cord either resulting from injury or in the form of the epidemic cerebro-spinal meningitis. In an inflammation of this kind the whole phenomena of tetanus may be observed. The cord itself is healthy, but excited to overaction by the implication of the roots of the nerves, for there may be not only opisthotonos, but general rigidity of the limbs accompanied by pain in them and hyperæsthesia of the whole body. In spinal meningitis there is often exquisite pain on moving the limb, but whether this is purely muscular or due to an inflammation of the nerve is not very evident; sometimes in recent hemiplegia a painful contraction of the arm is observed. There is hyperæsthesia and hyperalgesia. If these symptoms have come on slowly we are still right in supposing that there is a meningitis, but that it is of a chronic character. Such cases are very common; cases where there is a commencing loss of power with altered sensation, and at the same time a rigidity of the limbs ending finally in their permanent contraction. The condition is explained by a chronic inflammation of the membranes of the medulla, including the roots of the nerves which are attached to it. In some of the most marked instances of contraction with only a partial loss of true spine function, a thickening of the membranes has been found. In such cases Charcot and his followers have diagnosed a sclerosis of the cord itself, but there has not been a sufficient number of cases recorded in this country to corroborate his statements. These cases are so chronic in character that they usually come to a termination in a private home or a workhouse, and thus the opportunity for examination is lost.

In the first case given below there can be little doubt that the symptoms point to an acute spinal meningitis. The next case is a similar one, where the inflammatory process has been a little more slow; and in the third where the legs are contracted a still more chronic and local affection has been present. If in such a case as the last we suppose the meningitis to involve only the lower portion of the cord, we can easily believe in a local meningitis of any other portion. Thus, in the following case it was a question whether a supposition of this kind should be made or the case be regarded as one altogether functional. A woman sent to the hospital by Mr. Lush, of Weymouth, had paroxysms of spasm of the flexors of the forearm causing contraction of the hands, and, at the same time, some apparent loss of power of the whole muscular system of the body. In all such cases an efficient cause is found in a meningitis of the cord and its attached nerves, since post-mortem examination has proved in many instances that such a condition has existed with the symptoms above named. When, however, one limb or a single muscle is affected a considerable difficulty of explanation arises, and no clear idea is gained by saying that a child who suddenly gets a strabismus or a contracted leg is the subject of cerebral disease, or that a girl who possesses a spasmodically contracted arm has spinal irritation. The exact pathology of such cases has yet to be discovered, and it is very evident that there is a large field for research in the morbid changes of the nerves themselves, not only at their spinal origin, but throughout their course. One of the most common of these obscure affections is wryneck, as in a case I give below, where all means of cure were inefficient; an experience which corresponds I believe with that of most medical men. Sometimes the muscles of the jaw are affected and the spasm equally intractable. A medical friend has a patient with this idiopathic trismus, who is quite unable to open her mouth on account of spasm of the masseter, and who has taken a variety of medicines in vain.

In the second case given below it will be seen that although it was treated early there was no arrest of the disease.

In speaking of wryneck there is a fact worthy of observation and further investigation; that in young persons subject

to this affection the head and face on the contracted side do not develop as on the other, and in consequence there is a want of symmetry in the countenance when narrowly examined from the front. One eye is slightly lower than the other, and the whole of that side of face and head is smaller than on the other. In a lad lately in the hospital with heart disease a wryneck existed from infancy, and this remarkable want of symmetry was very evident. In a young lady patient, also, who is otherwise well grown, this disproportion of the two sides of the head and face is well shown. It may be asked whether this is due to some failure of nervous influence having its foundation in the same cause which produced the wryneck, or whether the contracted muscle itself exerts an influence on growth, and, if so, whether the division of the sterno-mastoid would allow development again to proceed. I relate below the case of a man with wryneck, to show how little influence galvanism had over the spasmodic contraction. The fourth case is one of tetanilla, which I report in consequence of attention having been directed of late to this affection. There was a point of interest as regards diagnosis, for the case being attended by febrile symptoms a suspicion of meningitis existed rather than that the case was one of a simple spasmodic affection; as, however, the patient quickly recovered, the diagnosis must be given in favour of the latter.

Case 1.—*Acute spinal meningitis.*

(Seen on October 10th, 1872.)

J. F—, æt. 12. Two weeks ago began to feel some weakness in his legs, which made him stoop when he walked. He was a quick, intelligent boy, and, as a kind of amusement, he made himself some crutches, saying he must take to them. At the end of six days he was unable to walk, and had to keep his bed, and a medical man was sent for. He was then lying on his side, with his legs drawn up and complaining of pain in them. All these symptoms increased until I saw him on October 10th. He was then lying on his left side with his legs drawn up, his knees to the abdomen and heels to buttocks. On touching his legs, or on attempting to move

them, he screamed out with pain. The muscles were hard, as if spasmodically contracted, and the tendons were rigid. The skin also was extremely sensitive, the hyperæsthesia extending all over the limbs and reaching as high as the umbilicus. Towards the back and over the lumbar region the sensitiveness was extreme. His condition was one of spasmodic contraction of the legs accompanied by pains. He had hyperalgesia and hyperæsthesia.

On inquiry about any injury the lad stated that on the 24th August he was playing with another boy, who was carrying him, when he fell off on to his back, striking himself on the kerb-stone. He felt great pain for a moment, but this passed off, and he thought no more of it. He was ordered Liq. Hyd. Perchlorid. and Potass. Iodid., with ice to the spine. He remained in much the same state as above described for a few days, with the exception of having regular attacks of opisthotonos, and then gradually grew better, and to-day (November 4th) the severe symptoms have mitigated, spasm being less and pain less.

Case 2.—*Chronic meningitis.*

(Reported by Mr. Wilkins and Mr. Nunez.)

Wm. B—, æt. 10, admitted under Dr. Wilks, May 15, 1872. He stated that ten months ago he received a blow between the scapulæ which hurt him very much and required the advice of a doctor. He stayed at home for a week, being unable to walk on account of the pain in the back. He afterwards again went to school for eight months, but never lost the pain. Six weeks ago he began to lose power in his legs, and the weakness has gradually increased up to the present time.

On admission.—He was seen to be a well-grown boy, and did not look ill; he could not walk without assistance, being only just able to stand alone. His only symptom was partial loss of power. Sensation unaffected. On the supposition that some inflammatory process might have been set up by the injury he was ordered the Liq. Hyd. Perchlorid. ʒj, and Potass. Iodid. gr. iv, three times a day.

After four weeks he thought his legs were a little stronger, that he could move them better, and was able to stand. He continued his medicine, but at the end of another month it was evident that there was no real improvement, for he was beginning to feel pain in his legs, at the same time they were less sensitive and the muscles were beginning to be rigid. There was also some weakness of the bladder.

On July 9th he was galvanized. When a continuous current of thirty cells was applied to the spine, the arms were moved outwards, and the legs drawn up in jerks. Faradization to spine had no effect, and when applied direct to the legs the muscles did not respond.

At the beginning of September the spasmodic contraction was increasing so that he had a sand bag placed across his thighs to prevent them being drawn up. Continuous current been used daily to the spine. He was ordered gr. $\frac{1}{4}$ of Ext. Physostigmatis three times a day, and after a week it was increased to gr. $\frac{1}{2}$. By mistake he took a double dose, 1 gr. He soon became very ill, and when the house physician was called to him an hour afterwards he found him with a clear froth coming from his mouth, perspiring profusely, his face turning blue, hands cold, numb, and almost powerless. Pupils of natural size. Pulse 130. Quite sensible. He had an emetic powder followed by warm water, and three hours after taking the pill he had quite recovered.

The above-named paralytic symptoms increased, at the beginning of October the legs being quite rigid, so that by lifting the heel the whole body could be raised, the knees were bent with great difficulty, but, if so, the legs suddenly contracted or flew up to the body. Sensation had also become much impaired as high as the sixth rib. Almost complete loss of power of bladder. Ordered Succ. Conii to see if it had any influence over the spasm, and he took it a few days, but with no result. It was observed that his abdomen was flaccid immediately after raising his clothes, but upon feeling it the recti became quite rigid. The same fact had been observed before in the legs, that they became much more rigid after being touched.

On November 1st limbs again tested by galvanism and faradization. The muscles responded to both, but their susceptibility was impaired, being much less than that of the arms.

Case 3.—*Chronic meningitis.*

(Reported by Mr. D. B. Lees.)

James M—, æt. 33, a sailor, had genital sore, but it is very questionable whether he has had constitutional syphilis. Six months ago, whilst in the Mauritius, he began to feel weak in his legs and to walk as if he were tipsy. The weakness gradually grew worse, and the limbs were beginning to contract when the doctor applied a red-hot iron three times on each side of the spine. No good result followed, and the contraction gradually went on, especially in the right leg. Whilst on shipboard he used to keep the leg forcibly down by a weight.

Admitted to hospital on October 21st. When placed in a chair he sat with his knees drawn up to his chin, his knees next his buttocks. The legs quite rigid, so that by attempting to extend one of them his whole body would be lifted up. The right leg, which was first affected, was more rigid than the left. The knees came together, although one was a little lower than the other. No pain over the spine. No difficulty with bladder. The muscles hard, extensors somewhat wasted, tendons rigid. He was placed under chloroform, when the left leg was readily extended, but the right could not be moved from its position. Tested with galvanism. On applying the continuous current to the extensors of the left thigh, and making and breaking contact, the muscles responded, but this was more marked when faradization was used, the limb then becoming nearly straight. The muscles of the right leg acted in the same manner, but with no tendency to straighten the limb. Sensation unimpaired.

Case 4.—*Torticollis.*

(Reported by Mr. C. Knott.)

Alfred G—, æt. 37, admitted February 28th, 1872, and left June 23rd. Works at oilcloth factory. Always enjoyed good health, and his habits were steady and regular. Never had any severe illness. Exposed to cold. About a twelvemonth since

he found his head becoming gradually drawn to one side, his face looking to right shoulder, the muscles of the neck stiff, and some little difficulty in swallowing. This continued until admission.

Patient looks well, and whilst lying on his pillow his complaint is scarcely apparent, as he moves his head from side to side; but immediately he rises the left sterno-mastoid contracts, and his head moves to the right side.

Faradization was used to the left sterno-mastoid muscle, and caused marked contraction. This was continued daily, and after some time the muscle seemed more readily affected by a less strong current. It seemed, indeed, as well as the trapezius, to have greater excitability than the muscle on the other side. The continuous current from twenty Daniell's cells was then tried, and had no effect on the left sterno-mastoid, although it caused contraction of the platysma, whilst it produced the usual effect on the sterno-mastoid and trapezius of the right or unaffected side. The two forms were tried for six weeks, but without any permanent benefit, and were, therefore, discontinued. He was then ordered injections of arsenic for nine days, but without any result. He subsequently took bromide of potassium and then Tr. Cannabis, and on some days he thought he was better and the muscle more supple; but he again became as bad as before. A consultation then took place with the surgeon about the propriety of an operation for dividing the muscle or the muscular branch of the spinal accessory nerve; but the patient not approving the proposition left the hospital unrelieved.

Case 5.—*Tetanilla.*

(Reported by Mr. C. Knott.)

William H—, æt. 18, a draper, admitted under Dr. Wilks, March 22, 1872, and left April 25th. About last Christmas he suffered from severe neuralgic pains in the head, and on one occasion his hands became clenched for about half an hour. He remained well until the day previous to admission, when he suffered much from headache, but this passed off in the

evening. In the night he was attacked again by severe pain in the head and legs. Afterwards his arms became affected. He put them in hot water with slight relief. Getting worse, he was sent to the hospital on the supposition that he had rheumatic fever.

On admission he was seen to be a healthy-looking and well-grown lad; he complained of severe pains in all his limbs, more especially in the arms. These were placed across his chest and spasmodically contracted. The muscles were rigid, the thumbs drawn to the palms of the hands. There was a severe aching pain down the arms, increased on movement. Sometimes there were paroxysms of cramps, when he called out with pain.

On examination of the body the abdominal muscles were observed also to be slightly rigid, and it seemed that he scarcely used his abdominal muscles or diaphragm during respiration. Legs unaffected. There was considerable pyrexia, the temp. being 100·9°, resp. 24, pulse 94. On seeing him some time afterwards it was found that the spasm persisted, although there were paroxysmal attacks, when there was violent cramp attended by much pain. The case was regarded as one of idiopathic spasm or tetanilla; although with the presence of febrile symptoms there was a question whether a meningitis ought not rather to have been diagnosed, and, if so, that portion of the cervical cord should have been affected which included the origin of the phrenic nerves. Ordered fifteen grains of chloral three times a day. In evening he was asleep and quiet. Temp. 101·6.°

23rd.—Much the same. Temp. 100°, and somewhat higher at night. Herpes coming out on the face.

24th.—Tetanic symptoms passing off. Two symmetrical patches of herpes on both sides of the mouth, in course of superior and inferior maxillary nerves.

25th.—In morning pretty well; in evening return of paroxysm.

27th.—Continued improvement. Pains passing off. Pins and needles in arms and hands. Perspires very much. Feverish symptoms abating.

April 2nd.—Slight cramps in the legs, lasting about half

an hour. Left his bed. When walking complained of stiffness in his knees. This continued for some time.

Left on 25th, when able to walk well.

IV. Vertigo and Cerebral Symptoms occurring in Deafness and other affections of the Ear.

Since my attention was drawn to the subject of the connection between affections of the ear and cerebral symptoms I have seen several cases showing its frequency. The readers of Trousseau will remember that he gives a very good account of the complaint, and alludes to the writings of Ménière, who was the first to recognise the fact that vertigo and other symptoms, usually referable to congestion of the brain, might be dependent on disease of the labyrinth, and more especially of the semicircular canals. The subject is also referred to by Ramskill in 'Reynolds' System of Medicine.' Toynbee wrote a paper on giddiness in connection with affections of the ear in the 1st vol. of the 'St. George's Hospital Reports,' and there is every reason to believe that his observations were quite original; it may be said, indeed, that every one was aware that vertigo or momentary loss of consciousness might be induced by pressure on the tympanum, but that we are indebted to Ménière for clearly raising cerebral symptoms, as dependent upon the ear, into a distinct complaint. Toynbee states that pressure upon the labyrinth produces cerebral symptoms; or pressure upon the membrana tympani, acting through the stapes on the vestibule, will cause a sense of giddiness, an inability to walk straight, loss of distinctness of vision, and a general depression of spirits. Also similar symptoms by exhaustion of the tympanum in cases of occluded Eustachian tube. Blowing forcibly through the Eustachian tube into the tympanic cavity will cause a feeling of lightheadedness and swimming. It may be remembered that many persons experience a sense of giddiness, almost to falling, by a violent blowing of the nose. Toynbee also mentions giddiness and other cerebral symptoms resulting from pressure of wax on the membrana tympani; and, amongst other causes, artificial drum, tumours, and even syringing the ear.

These facts show the intimate connection between the internal organ of hearing and nerve symptoms, but in individual cases which are constantly coming before our notice, where disturbance of hearing is associated with cerebral symptoms, there is considerable difficulty in determining whether the affection of the auditory nerve has been the seat of all the other troubles, or whether it be not like them attributable to a common origin. Thus I am often seeing two ladies of nervous temperament who complain of swimming, noises in the head, and disturbance of the organ of hearing, in whom I regard all these symptoms as concomitant and springing from one source. I have in my note-book the cases of three old gentlemen who are troubled with giddiness, deafness, and other slight cerebral symptoms, but probably all these have a common origin in a decaying brain and senile blood-vessels. Then, again, periodic attacks of giddiness and sickness are well known to many persons under the name of bilious attacks. Lesser degrees of vertigo constantly accompany dyspepsia, and, as far as my experience goes, these forms differ from those which have an organic origin in the effects which result from position. Thus, in advanced age, where there is a suspicion of organic changes, as well as in the aural vertigo, all movement aggravates the unpleasantness of these symptoms, whilst they pass off upon resuming the recumbent posture. Now, in stomachic vertigo I have heard patients give the same experience as myself, that whilst in the upright position, or whilst walking, it is slight, but in stooping, or lying the head upon the pillow, a violent swimming in the head is experienced ; this passes off upon rising, but immediately returns when the horizontal posture is resumed. The epileptic vertigo is generally associated with other symptoms by which its true character can be recognised. I am now seeing a gentleman who, without any warning, becomes giddy and sick. The attack has no reference to any stomach disorder, and is clearly nervous. At a former period of his life he had distinct epileptic fits. The vertigo corresponds with the aura, which may sometimes occur without loss of consciousness, as in the following instance where the aura took the form of a neuralgia. A young lady had been suffering for two years from fits in which there was first of all an intense pain over the right eye, followed by

insensibility and drowsiness. After taking the bromide of potassium for two months the fits ceased, but on three occasions since she has been seized with the pain over the right eye, but instead of being momentary as before it remained nearly five hours. In the true auditory vertigo, as described by Ménière and Toynbee, the giddiness is often the only cerebral symptom; this persists and yet there is no evidence of any disease of the brain; the deafness, also, is found to be due to no external cause, and, having come on rather suddenly, may be put down as the cause of all the other nervous troubles. The vertigo may so distress the patient that, in the course of time, loss of memory, inaptitude to business, and other conditions of a mental character may ensue. Of numerous cases which I have seen I have no subsequent history as to their termination, nor, indeed, as to the exact nature of the disease in the ear. In many the disease has been in the tympanum, and, therefore, if the immediate cause of the vertigo is to be found in the labyrinth, some change has been propagated thereto through the vestibule.

In a case of a young man who came to me complaining of giddiness and deafness, with a history of syphilis, a cure was effected by the iodide of potassium.

The same occurred in the person of a friend. He one day walked into my study, or rather staggered in, declaring that his head was so light and he had such giddiness that he could not walk in the street, and had in consequence given up practice. He rolled about when he walked, and had a confused expression; he said he had disease of the brain, and that it was "all up" with him. At the same time he had become very deaf with the left ear. I remembered that he had syphilis some years ago, and had suffered more recently from a sore tongue, and I therefore suggested the iodide of potassium in large doses. He rapidly lost all his unpleasant symptoms, and was soon at work again.

The worst forms of the complaint under consideration are those where no cause can be assigned for the disease of the ear. Thus, at the present time I am seeing a lady, aged 35, who states that she took cold after her last confinement, four years ago, and from that time began to be deaf, first in one ear and then in the other, until both were affected. She is

not at this moment perfectly deaf, as she can hear loud sounds; but at the same time as her hearing became affected she began to experience giddiness and noises in the head. These she has had ever since, although varying in intensity. She has been treated for stomach and liver without any result. She has a distressed look; she feels worse on moving or stooping, and when she walks often staggers like a drunken person. Nothing is seen on examination of the ear.

Another patient I am now seeing is a gentleman, æt. 40. He is a healthy-looking farmer, but for some time past has suffered from giddiness and deafness. It incapacitates him for business, and he has loss of memory. The question which is asked is—Are his symptoms due to a general cerebral affection like commencing softening, or are the whole of them due to a disease of the auditory nerve?

Another patient who suffered from vertigo as his only symptom had an old perforation of both membranæ tympani, and the Eustachian tubes were obstructed. In another man with perforation of both membranes there were exactly the same symptoms; he had had vertigo for several years, but no other symptom. Also another patient who had attacks of vertigo accompanied by sickness, was deaf with one ear, and thus showed a probable cause for his symptoms.

I do not venture upon an opinion as to the affection of the ear in those cases of deafness where nothing abnormal can be discovered on examination. The aurist speaks of these as cases of nervous deafness, but probably there may be a variety of causes which tend to injure the deeper structures of the organ of hearing; such as violent blows or various inflammatory affections. Some of these have been indicated by Mr. Hinton in a former volume of the 'Reports.' But lately I saw a gentleman who, after a fall on the head, became perfectly deaf, and he no doubt directly injured the organ of hearing. Some years ago I had a lad in the hospital with severe febrile symptoms, shivering and delirium, and who at the same time was perfectly deaf. After lying in a precarious state, rolling his head about as if in pain, and having vomiting and other cerebral symptoms, he recovered but remained stone deaf. He had suffered probably from an acute affection of the labyrinth, but whether as a part of an inflammatory affec-

tion of the brain or whether as a primary inflammation with the cerebral symptoms dependent upon it was not very evident. It may be remarked that in otitis there may be observed cerebral symptoms of a very severe character, and which may be due simply to a reflected irritation from the brain. I admitted some time ago a patient into the hospital with otitis, febrile symptoms, great pain in the head and delirium, in whom I suspected the presence of disease of the temporal bone with implication of the dura mater and brain. She, however, got better, and was afterwards employed as a nurse, being still deaf with discharge from the ear.

V. Uses of Galvanism.

It must be generally admitted that the therapeutical uses of galvanism have received a fresh impulse since the introduction of the continuous current into practice. Until a few years ago the only method in use except frictional electricity was that of faradization. This was sometimes beneficial but as often quite valueless, so that galvanism was either indiscriminately recommended in all forms of paralysis or was systematically neglected. A very different feeling, however, prevails at the present time, for we are beginning to discern in what cases faradization is useful, and in what cases it fails; more particularly has it been noticed that it is in those very cases where faradization has been useless that the continuous battery current has been so fruitful of results. We some years ago introduced into our electrifying room a large battery in which any number of cells up to 100 could be combined, and with this instrument we have witnessed a success in many cases which scarcely could have been anticipated. We have a large number of patients daily being operated upon, and two or three attendants constantly employed either in the room or in the wards.[1] It has not yet been satisfactorily determined

[1] At the same time as we adopted these improved methods of using galvanism we obtained the service of a special electrician, Mr. Sandy, who in applying its various forms in a judicious and intelligent manner, has added much to the success of the remedy. To him also we are indebted for a simple and inexpensive battery which can be carried into the wards of the hospital for the use of those patients who are unable to leave their beds.

why one form of galvanism should fail to stimulate a muscle and be useless as a remedy whilst another form excites it to contraction and is curative. This may be dependent upon the condition of the muscle or of the nerve which supplies it, or the centre whence the nerve springs; at the present time the facts themselves are not sufficiently established, but when they are so we shall be able to use them as a means of diagnosis. All I shall attempt to do here will be to state some of the facts we have observed, and thus offer a small contribution towards the material out of which some more important conclusions may be eventually framed.

In the first place we had no sooner possessed our battery than we discovered its marked value in cases of simple paralysis of the limb. In these cases faradization often fails to produce the slightest effect, whereas the application of the continuous current immediately excites the muscles to contraction, and eventually brings about a cure. A good case of the kind I give below. Then, again, in various forms of paraplegia, its good effects have been most striking. As I have before said, it is most difficult to ascertain, in various forms of paralysis, whether an organic disease of the cord exists or not, seeing that all the symptoms which attend it may occur in the case which is functional and curable, and therefore it is true that galvanism has been used in many cases and failed; but, on the other hand, we have had a variety of cases which may be included under the term paraplegia, where a complete cure has been effected by applying the current to the back. In some cases of locomotor ataxy I have witnessed perfect recovery, both in hospital and private practice; also in cases of commencing progressive muscular atrophy. In paralysis agitans I never saw much good done by faradization or any other remedy, but in a case I mention below it appeared as if much benefit might accrue from the use of a continuous galvanic current down the spine. In no case is the effect of the continuous current to the limb so remarkable as in the atrophic paralysis from lead, two examples of which I shall presently relate. The fact has now for some time been observed that the muscles in this affection are not susceptible to the interrupted current or faradization—that a painful amount of it may be used, and yet there shall be no response on the part

of the muscle. I have had several cases in the hospital which completely establishes the fact. On the other hand, if the continuous battery current is used, even in a mild degree, excitation immediately occurs; that is, when the current is completed and again broken.

In the very first case on which I experimented some years ago we found in the case of a young man suffering from lead paralysis, that whereas no irritation of muscle could be displayed by the magneto-electric machine, immediate contraction took place on the application of fifteen cells of the battery— an amount which produced a scarcely perceptible effect on the arm of a healthy student.

It is observed that as the cure progresses so the susceptibility to the continuous current becomes less and that to faradization greater, until, as in the healthy subject, both forms cause contraction of the muscles. The case of lead is very striking, because there are kinds of paralysis in which the two forms of galvanism act in the opposite manner; thus, lying in a bed near that of our patient, who was the victim of lead poisoning, was a girl suffering from old-standing spinal paraplegia; in her case the continuous current produced not the slightest effect in stimulating the muscles of the leg, whilst faradization produced strong and painful contractions of the muscles. The same occurred in a man who had long been bedridden with an incurable paraplegia. It has been thought that faradization acts directly upon the muscle to stimulate it, whilst the continuous current acts thorough the nerve. This has by no means been proved, but if it had it might be used as an argument that in lead poisoning it is the muscular rather than the nervous system which is affected by the metal. Such an opinion, however, is not borne out by experience, seeing that the whole cerebro-spinal centres may become atrophied in plumbism, as evidenced by epilepsy, general paralysis, or dementia. The atrophy resulting from lead differs from that which is called idiopathic in this respect, that although in the two cases no difference is observable in the form of wasting, yet in the latter there is very little susceptibility to either form of galvanism. It has been suggested by Dr. Russell Reynolds that there is no essential difference between the primary and the induced current, but that the simple interruption in the one

case is sufficient to account for its peculiar effect—that muscles under abnormal conditions may not be able to take cognizance of a simple current passing through them, whereas they would if it were broken. If this were so the primary battery current, if interrupted, should produce the same effect as the ordinary induced current or faradization. In one or two cases where the experiment was tried the result did not verify the suggestion. Where, for instance, one pole was placed just below the elbow and the other pole stroked down the arm, a contraction took place when it was lifted from the limb or again replaced. The current was then interrupted by a wheel, but exactly the same phenomena occurred, contraction on making and breaking contact, but none whatever as the sponge was stroked down the arm. With faradization, on the contrary, violent contraction took place. In this case, therefore, the difference between the two forms, even when both were made to intermit, seemed well marked. Further observations, however, are required before I could give a decision on this matter, either for or against the suggestion of Dr. R. Reynolds.

I have already spoken of the intractability of cases of spasm and contraction of the muscles. In many cases organic disease of the spinal cord and nerves exists, and, therefore, no result could be expected; but even in others, as in wryneck, where an immediate effect of galvanism was witnessed, no permanent good resulted from its use. Even in cases of so-called hysterical contraction of the arm I have been much disappointed at the failure of galvanism.

The effects on the muscles in the cases of spasmodic contraction is seen in the reports, in which it appears that they are more susceptible to faradization than to the continuous current.

One must not forget to mention the soothing effect of galvanism. In cases where neuralgic pains have existed, patients have expressed themselves as much relieved by its application, and have often slept better afterwards.

The public is so much impressed with the value of electric baths that I proposed to try it in a case of lead poisoning. I am aware that others have pronounced it to be valueless, which, in all probability, is the case, there being no proof that the galvanic current passes anywhere but over the surface of the

body. In my case the speedy success was so remarkable as to throw strong suspicion on its having had any value at all.

I give the case below with the mode of use. Usually, I believe, the plan has been to place the patient on an isolated stool in the water, with one pole in his hand, the other being attached to the bath. In the present case Mr. Sandy used a different method.

Case 1.—*Paralysis of Leg.*

George W—, æt. 36, admitted into Stephen Ward June 19th, for weakness of the left leg, and left July 23rd. This man was the subject of a remarkable enlargement of the veins on the surface of the abdomen, indicating some obstruction to the vena cava. He had observed this fourteen years, but it had given him no inconvenience nor interfered with his employment.

Patient stated that in March last he was seized with very acute pains through the left hip and groin, which gradually spread down the leg; and these pains were worse at night. Went to Swansea Hospital, where knee became contracted and he took to crutches. He was then sent up to Guy's Hospital. He was put to bed, being quite unable to walk, on account of pains and weakness in the left leg. On examination, no local cause was discoverable for the symptoms; the leg was somewhat drawn up, it was perceptibly wasted, being smaller than the other and sensation slightly impaired. On testing the limb the muscles were found to respond to both the faradic and galvanic currents. He was then ordered the continuous current to be applied daily to front and back of thigh. After the first application he expressed himself as having much relief from the pain, and in a few days it had altogether left him. At the same time the strength returned in the muscles, so that in a few days more he could walk. The current was still applied with a daily improvement in the strength of his leg, so that on July 10th he was walking about, and on the 21st he sufficiently recovered to be able to leave the hospital convalescent and nearly well. Patient took no medicine.

Case 2.—*Paralysis agitans.*

J. B—, æt. 40, had been suffering for three years from paralysis agitans. The complaint commenced in the right hand, afterwards proceeded to the left, and then to the legs, until a general tremor of the whole body took place, including the face, and affecting the speech. He had been under different kinds of treatment, but without any benefit. I wished to try the continuous galvanic current to the spine, and accordingly fifty cells (Cruickshank's) were used for ten days. After the second application the patient, who had previously had very restless nights, obtained refreshing sleep. After four or five applications he began to experience a decided benefit, saying he always felt lighter and steadier directly he had been operated upon. The duration of this improvement lengthened day by day. The patient then left for the country, and has not since been heard of.

Case 3.—*Lead paralysis.*

Mr. S—, a gentleman of middle age, was brought to me, on March 11th, 1872, by Dr. Charlton, of Fareham, suffering from a most severe form of lead paralysis. His whole frame was attenuated in consequence of the atrophy which his muscular system had undergone; his limbs were very much wasted, and he was proportionately enfeebled. He tottered when he walked, his hands shook, and were so weak that he with difficulty could raise them to his head or button his coat. He resembled, indeed, the condition of a man with progressive muscular atrophy, only in this case it was induced by lead and was not idiopathic.

The history which he gave of his case was as follows: He lived in Surrey, about twenty miles from London, and had enjoyed good health until June, 1871, when his arms and hands became tremulous, so that very shortly he was obliged to use both hands to raise fluids to his mouth to prevent spilling. He was recommended a change of air and took a trip to Scotland; after being there a month he got considerably better and returned home. In a fortnight all the symp-

toms reappeared more severe than before. He went away again to Southsea, and there used salt-water baths, when he a second time rapidly improved, and at the end of a month returned home. Shortly afterwards, however, the old symptoms reappeared, when he was advised to consult a London physician. He was ordered to use galvanism in the form (he stated) of magneto-electric shocks, which did not benefit him, when his doctor, suspecting lead, had his drinking water analysed and found it to be strongly impregnated by lead. He was then, of course, put on a proper course of medicine, desisted from the use of water, and he improved. He had continued the use of the galvanism. He subsequently left London and again went to Southsea.

When I saw him in March he had got into a stationary condition, and was in the state above described; his limbs wasted and with little power in them. I ordered him some small doses of iodide of potassium and quinine, and wished him to use a simple galvanic current rather than electro-magnetism. Finding there would be a difficulty in making use of this at his own house, I advised him to go to Guy's Hospital every morning, and to this he readily assented.

Mr. Sandy, the electrician, tried the effects of the continuous battery current upon him, and also the induced current, with the following results. In the right arm the extensor muscles contracted well by the application of twenty cells of the Daniell's battery. The induced current was applied, as strong as the patient could bear, with scarcely any contraction. In the left arm the muscles contracted well by fifteen cells, and with precisely the same results as the right arm, with the induced or interrupted current. In the legs twenty cells caused good contraction, but scarcely any result was obtained by the interrupted current.

He continued the use of the galvanism to the limbs daily and made visible progress.

On April 18th he had considerably more power of the limbs than he had a month previously, and, on the muscles being tested, it was found that the 'induced' current which had been powerless before, now excited the extensor muscles of the right arm, so that the hand was raised on a level with the arm. On application of the same strength to the left arm it

extended the fingers much more than the right, but the hand was not lifted to the same extent.

The patient persisted in the treatment up to July, during this period gradually improving, and in August he had quite recovered the use of his hands and was following his usual occupation.

Case 4.—*Lead Paralysis.*

Margaret C—, æt. 47, admitted February 29th, 1872. She has been married and has a large family. Two years ago her husband died, when she was obliged to work for her living. She gained employment in some lead mills, her business being to grind the white lead. For some months past she has been getting thin and feeble, her arms wasted, together with stiffness and pain in the shoulders. Has had slight colic.

On admission.—She is seen to be a small spare woman, anæmic and sallow, looking indeed extremely ill. She is thin, owing to a general wasting of the muscles of the whole body, more in the extremities and especially in the arms. She is too feeble to walk, and, therefore, obliged to keep her bed. She can scarcely raise her arms from her side, owing to the atrophy and weakness of the muscles; the extensor muscles of forearm are extremely wasted, rendering the arm quite flat, the wrists drop without there being the slightest power to raise them. Muscles of hand soft and flabby, the right arm and hand worse than the left, so that she cannot use them for feeding herself. The blue line on the gums well marked, and a distinct blue stain along the lower lip corresponding to the stained border of the gums. Slight œdema of eyelids. Ordered ten grains of iodide of potassium three times a day. Tested by galvanism. Faradization:—As much power as the patient can bear has a very slight effect upon the extensors of the thumb and not upon the other muscles. Continuous battery current:—Good and well-marked contraction of all the extensors by twenty Daniell's cells. The continuous current ordered. Mr. Sandy finds the more efficient method to be by placing the fingers in water containing a little salt, the negative pole is placed in the water, and the positive pole gently stroked along the extensors. This causes contraction of the

muscles and elevation of the wrist; when the poles are reversed the current and the effect are less.

April 17th.—The continuous current has been used to the limb daily up to the present time, and the improvement has been marked though gradual. The blue line on the gums is much less. She is out of bed to-day for the first time. As the improvement has been going on, so the muscles have become susceptible to faradization, whereas they have required a larger amount of simple galvanism to affect them.

May 13th.—Improved considerably; walks about. Is able to feed and dress herself. Can extend the wrist, and the arms are larger in bulk. Blue line on gums and lips disappearing. On testing with faradization, there is marked contraction in the extensors, the hands being well lifted; this is more so in the left arm than the right, the right being always weaker and smaller.

In this case it may be remarked that besides a well-marked blue line along the edge of the lower gums there was a dark patch on the mucous membrane of the under lip, corresponding in position to that on the gums, but rather more defined and dotted. A question is always asked in the wards whether this mark on the lip is formed independently or follows that on the gums from contact? The latter is the probable explanation.

In these cases of dropped wrist the back of the hand is often observed to be rounded, apparently from enlargement of the metacarpal bones, but due in all probability to some thickening of the thecæ.

Case 5.—*Plumbism treated with electric bath.*

Wm. J—, æt. 36, admitted under Dr. Wilks July 17th, and left July 27th. He began to work at grinding lead nine months ago, and at the end of about five months commenced to feel ill, with loss of appetite, pains in his head and abdomen, and general debility. He continued at his work and daily grew worse, until a week ago, when he was obliged to desist, having pains in his limbs, sweating and inability to stand, and vomiting.

On admission.—He was seen to be very pale and very thin,

having evidently lost a great deal of flesh. Skin hot, tongue furred, marked blue line on gums. Constipation. Recti abdominis contracted and painful.

July 20th.—Ordered an electric bath. This was made by Mr. Sandy as follows :—the bath being prepared, enough sulphuric acid was put in it to give it a slight acid taste (about ℥iv), the negative pole of the battery, attached to a large sheet of copper about two and a half feet square, was put upright in the bath and the patient placed in it so as not to touch the copper plate; the hand of the patient was held out of the water and in it he held the positive pole. Fifty and eighty cells were tried, but when the current was applied to the neck instead of the hand the patient could not bear more than fifty cells. On making and breaking contact the patient felt a kind of thud through the whole of the body. A bath lined with glazed tiles was used.

The patient used the bath again on the 24th and a third time on the 25th. He said he felt very cold after it. He always had his bowels relieved immediately after it. On each occasion he felt better, and on the 27th he was so much improved that he went out.

ON

SUDDEN DEATH FROM SYNCOPE SOON AFTER LABOUR.

By J. J. PHILLIPS, M.D.

I PROPOSE in this communication briefly to report a few cases of sudden death from syncope soon after labour which have come under my notice, and thus to call attention to a class of cases which, though not of frequent occurrence, are yet worthy the notice of those engaged in obstetric practice.

The knowledge which has been accumulating during the last few years on the subjects of Thrombosis and Embolism has given a satisfactory explanation of a large number of cases of sudden death after labour, and has also been the means of throwing much light on many other puerperal complications. But perhaps the tendency in obstetric practice has lately been to regard from too exclusive a point of view those instances of sudden death which unfortunately are prone to occur during labour and the period of lying-in, including them under the one head of death from embolism. Feltz[1] has, indeed, endeavoured to prove that, when not due to embolism or thrombosis of the pulmonary artery, they are the result of small capillary pulmonary or cerebral embola; but it will be enough here to state, in the words of an able reviewer of Feltz's work, that "he altogether fails to prove that in the human subject death can result im-

[1] 'Traité clinique et expérimentale des Embolies capillaires.' Strasbourg, 1870.

mediately from capillary embolism."[1] It is not intended, however, further to refer to the well-marked cases of embolic sudden death, nor to such causes as entrance of air into the veins, the shock resulting from extensive uterine lesion, and hæmorrhage, as productive of sudden death; but to quote a few cases of death from cardiac syncope in all of which both the symptoms preceding the fatal termination and the post-mortem appearances presented a great similarity.

A patient who may have gone through a perfectly natural labour, and who appeared fairly well during her pregnancy, is seized at a varying but usually a very short time after labour with faintness, from which she never recovers. The syncope is generally noticed to accompany some slight effort, such as an attempt to raise herself or change her position in bed. It will, however, be noticed that in almost every one of the typical cases to be recorded there was some antecedent history of breathlessness, either during gestation or labour, and that the patients were multiparæ, and were described as being pale and having the external appearances of women in feeble health.

In each case in which an opportunity of microscopically examining the heart was afforded the muscular tissue exhibited well-marked fatty degeneration. This point appears to be one deserving of special notice, and I cannot but think that it was an important factor in the production of the fatal result. I am, indeed, aware that a certain amount of fatty change in the tissue of the heart has been not uncommonly noticed in cases of child-bed death; but this degeneration, even if regarded (as it has been) as simply the result of certain blood changes incidental to pregnancy, must, I think, when once produced, be looked upon as having more than an accidental relation to the mode of death in these cases of fatal syncope.

Dr. De Cristoforis, in an elaborate paper published in the 'Annal. Univ. di Medicina,' Jan., 1867, "On Pregnancy as an Absolute Cause, direct and indirect, of Disease in various Organs," appears to me to furnish the correct solution of such cases. In considering pregnancy as an indirect cause of sanguineous dyscrasia and of organic alterations of the heart, he says, "On the one side there is greater activity of the reducing acts, tending to impoverish the blood, and on the other there is

[1] 'Brit. and Foreign Med.-Chirurg. Review,' October, 1871.

an absolute deficiency in the reconstructive acts, both together leading to anæmia, that is, to aglobulism, hydræmia, oligæmia, leucocythæmia. The earliest effects of this state are syncope, palpitations, vague sensations in the head, classed as headache, tendency to sleep, distress in the limbs, easily induced distress in breathing. The loss of muscular tone induces more feeble impulse of the heart; the pulse becomes soft and compressible; the respiratory acts are weakened, inducing deficient oxygenation, the nervous centres ill nourished give occasion to syncope. Nutrition being impaired, the patient emaciates and becomes pale. The loss of fibrin and albumen, rendering the blood thin, disposes to œdemas. If in this state labour supervenes, and a moderate loss of blood occur, if labour be protracted, if imprudent movement, as rising in bed, vomiting, &c., take place, the weakened heart is overcome, and death easily follows. The heart, badly nourished, falls into denutrition, its tissue retrogrades and is supplanted by fat."[1]

Having carefully excluded the existence of any thrombus or embolon in the following cases, there being even no loose clot in the pulmonary artery, the fatty condition of the heart seemed to me the immediate cause of death. A difficulty, however, presented itself in the state of the heart cavities, which were strikingly alike in all the cases, being almost empty and quite devoid of coagula. Thinking that this militated against the idea of death from asthenia, I asked the opinion of Dr. Moxon, and he assures me that the heart is always found empty in all cases of sudden death. In his large experience he has found no exception to this rule. In several cases, reported by Dr. Wilks,[2] of extreme fatty degeneration of the heart the cavities were also empty, or contained only a little liquid blood.

It has occurred to me that the same explanation as is here attempted to be given of these deaths would also especially apply to those cases of sudden death which are, unfortunately, sometimes met with after placenta prævia. Such cases occasionally terminate fatally even after delivery has been accomplished, and where there has been no hæmorrhage for some hours preceding death. I do not here refer to those cases which, I fear, are sometimes met with in which the shock or

[1] 'Biennial Retrospect,' New Syd. Soc., 1867–8, p. 389.

[2] 'Guy's Hospital Reports,' Series III, vol. iii.

hæmorrhage resulting from the too sudden emptying of the uterus in placenta prævia would appear to have an important share in hastening death, nor to those in which the hæmorrhage must be looked upon as the immediate cause of death, the patient never completely rallying after a severe loss, although the fatal event be delayed for some hours; but to such a case as the following:—Early in the afternoon of the 4th of May, 1872, I was called to a patient of the Royal Maternity Charity, æt. 44, in labour with her thirteenth child, the midwife having made out a placental presentation. There had been frequent severe hæmorrhages during the preceding two months. She had a small pulse, a great feeling of faintness, and was very pale. I found the os uteri dilated enough to admit the greater part of the hand, but with the placenta implanted over it. I detached the anterior portion of the placenta and turned the child by the bimanual method. There was no subsequent hæmorrhage. A firm abdominal support was applied, and brandy freely given. Believing it to be a practice of great importance in placenta prævia not to hurry delivery after turning, but rather, if possible, to secure expulsive uterine action, I left her after a time in charge of the midwife, and returned at four o'clock. Finding that labour was not completed, and that the uterus felt fairly firm, I aided by gentle extraction, and slowly delivered her. Her condition seemed very encouraging. I remained with her about an hour, the midwife still continuing in attendance. Soon after my departure she complained of feeling faint, made some slight movement on to her side, turned again on her back, and died in a very short time. I made no post-mortem examination except to ascertain that there had been no hæmorrhage.

Probably such a death must be attributed to sudden failure of the heart's action from feebleness of its muscular or nervous power; and the history of many cases of placenta prævia, in which the pregnancy is allowed to continue, repeated losses of blood occurring during the last two months, certainly affords a combination of circumstances most favourable to the aggravation of the hydræmic condition of the blood, to the subsequent deterioration of tissue, and to the production of death in the manner so well described by De Cristoforis.

Dr. Gusserow, of Strasbourg, published last year in the

'Archiv für Gynäkologie' (Band II, Heft 2), five cases of great interest bearing upon the subject of this paper. He calls them cases of an extreme degree of anæmia in pregnant women. The character of the symptoms and the course of the disease were strikingly alike in all. The age of the patients varied from twenty-four to thirty-six. They had previously enjoyed good health, and four of them had been before pregnant. Slowly in the course of pregnancy, and without any apparent cause, there supervened a severe degree of anæmia and hydræmia, and about the eighth month the fœtus was expelled in each case, and each of the five mothers died soon after labour. Gusserow made post-mortem examinations, but discovered no marked change, except the appearances of extreme anæmia and hydræmia and their consequences. He considers the slight fatty degeneration which was observed in the substance of the heart and in the abdominal viscera as simply the result of the blood change, and not the primary cause, and looks upon them as cases in which the alterations known to occur in the blood during pregnancy were carried so far as to become a pathological condition. Gusserow is so impressed with the fatal termination of these cases that he advises, in similar instances noticed during pregnancy, that abortion, or at least, as early as possible, premature labour should be induced, and warns us that transfusion may be necessary.

In reading the account which Gusserow gives of his cases, one is struck with the similarity which they bear in many respects to those cases described by Dr. Wilks in the volume of these Reports for the year 1857 as "idiopathic fatty degeneration;" and it is worthy of remark that, out of the seven cases recorded by Dr. Wilks, two were in connection with pregnancy, one of these two patients aborting at the fourth month, and the other being admitted into the hospital three weeks after her labour at full term. In both cases there was marked anæmia, and after death, which had been preceded by no other special symptoms, the only abnormal conditions found were those of extreme anæmia and fatty degeneration, especially of the heart. Dr. Wilks has since preferred to call this state "idiopathic anæmia," regarding the fatty degeneration as a sequel. The causation of this pathological condition of extreme anæmia, which exists independently of any severe hæmorrhages or exhausting discharges, appears

very obscure; but during pregnancy it is but the exaggeration of physiological changes, whose limits are exceeded from some unascertained cause. Vague as the idea may be, one is tempted to look for explanation of the perverted process in some obscure nervous influence; and to remember, with Virchow, that the cutaneous discolorations so very common during pregnancy, and which so much resemble those met with in the early stage of Addison's disease, suggest the influence of certain changes incident to pregnancy on the abdominal sympathetic.

In connection with the subject of fatty change noticed in the heart after labour, mention should be made of an important memoir by Dr. Hecker, of Munich, on sudden death in the puerperal state.[1] He relates cases in which death occurred with obscure symptoms one hour, twenty-eight hours, and forty-five hours after labour, and in which a general acute fatty degeneration of the organs was noticed. In one case, where the microscope showed very plainly the existence of fatty change in the heart, liver, and kidneys, there was an obvious similarity in some of the anatomical characters to the change in the liver and kidneys noticed in acute atrophy. I am not aware that any puerperal cases corresponding to Hecker's description have been published in this country, though cases of acute atrophy during pregnancy are not very uncommon; and I saw with Dr. C. C. Richards, in the beginning of this year, a case terminating rapidly in death soon after labour, in which it was evident that an acute change was going on in the liver and kidneys, as indicated by the acute jaundice and death by uræmia.

The importance of these acute degenerative changes described by Hecker cannot be over-estimated; but the immediate cause of death differs from that in the cases here specially referred to. Hecker's cases are evidently to be regarded either as due to a general state of blood-poisoning, or as quickly giving rise to such a state.

The cases to be quoted proved fatal *after* labour; but it is evident that a feeble heart may be the cause of sudden death during the expulsive efforts of parturition. Such a case was reported by Mr. Roper in the 'Lancet' for 1855. Although the muscular fibre of the heart was not examined microscopi-

[1] 'Monatsschrift für Geburtskunde und Frauenkrankheiten,' Feb., 1868.

cally, Mr. Roper informs me he has no doubt it would have been found in a degenerate condition. The walls of the heart were very thin, flabby, and soft. The muscle of the right side of the heart (both of auricle and ventricle) was very attenuated, in a degree more so than the left side.

Perhaps the mode of death in such a case differs a little from that in the subsequent cases, and I cannot do better than quote the pertinent remarks with which Mr. Roper has favoured me. He says, "I think the right heart became choked by accumulation of blood in it from difficult transmission of blood through the lungs during a labour-pain, while the breath was held in the act of straining. I suppose in the straining efforts of labour there is always an amount of obstruction in the pulmonary circulation and consequent engorgement of the right side of the heart, under which difficulty a very weak heart would be stopped in its action. There was no valvular disease. Death took place so rapidly that I had scarcely time to see that anything was amiss before the patient was dead."

In connection with the engorged state of the right heart and pulmonary circulation here referred to, one is reminded of the cases of comparatively sudden death met with from this cause in valvular disease. The acute pulmonary symptoms which have been noticed to supervene very rapidly about the middle of pregnancy when the augmentation in the volume of the blood becomes considerable, and gives increased work for the heart, and the similar embarrassment noticed after the efforts of labour accompanied by symptoms of so-called suffocative catarrh, especially in cases of mitral regurgitation, may all terminate in rapidly produced death. These cases, however, form a class by themselves, and do not come within the scope of the present communication. I will simply state that I have had the opportunity of seeing three fatal cases of the kind, death occurring either before the completion of labour or soon after, and at least two other cases attended by most urgent symptoms for some days after parturition.

Cases of sudden death from syncope soon after labour have indeed been noticed from very early times. Morgagni describes a typical case, in which a patient soon after labour was suddenly seized with dejection of spirit, coldness, and loss of pulse, and died in an hour and a half. On dissection the heart was ex-

ceedingly flaccid, scarcely any blood was found in the auricles or the right ventricle, and none at all in the left ventricle. Chevalier called attention to this state in a paper published in the 'Medico-Chirurgical Transactions' (vol. i), and mentions the case of a lady who grew suddenly faint two hours after the birth of twins, breathed short, and died in half an hour. The post-mortem appearances were in every respect similar to those described by Morgagni.

It is not intended, however, to insert here any historical review, nor indeed would such a task be an easy one, seeing that with the improved pathological knowledge of the present time fatal cases formerly regarded as inexplicable would now be referred to a well-defined and easily understood cause of death. The etiology of cases classed at present under the head of simple syncope may also hereafter be made more apparent; in the mean time it appears that a certain number of cases are met with ending in sudden death soon after the efforts of labour, and the only tangible evidence as to the causation of this termination is to be found in the fatty degeneration of the muscular walls of the heart.

It should be noticed that ergot of rye was given in two of the four cases here recorded; in one case for inefficient uterine action during labour, and in the other on account of the slight post-partum hæmorrhage. Dr. Thompson[1] believes that ergot should be prescribed with great care in cases where the circulation is weak, on account of its depressing influence on the heart. This is a point deserving careful clinical investigation; and it is to be hoped that, attention having been called to the subject, additional facts bearing upon it will be made known.

The experience gained from these and other cases points to the absolute necessity of strictly maintaining the horizontal posture for some time after labour, and also, it appears to me, the advisability of applying a suitable support in the form of an abdominal binder, to compensate in some degree for the sudden removal of the pressure to which the viscera and large vessels have for several preceding weeks been subjected.

I will first mention a non-fatal case of syncope. In February of the present year I was called, at midnight, to a patient who had completed her fourth labour that evening. Nothing unto-

[1] 'Brit. Med. Journ.,' Sept. 21st, 1872.

ward occurred for about an hour after delivery; but she then became very faint, and there was a succession of syncopal attacks so severe that the medical man thought she would have died. There was no hæmorrhage. Without disturbing her I examined the chest anteriorly, and found no evidence of lung mischief. There was no abnormal sound accompanying the heart's action, but the first sound was very feeble, and the heart beat very slowly. I ascertained that there was no concealed hæmorrhage. When I saw her she was sensible, but deathly pale. She gradually rallied, and had a tedious convalescence.

I may also mention another case. On the 23rd of last November I was summoned to a primipara at Stepney, with a view to aid delivery on account of a severe degree of syncope, which had come on in the course of labour. This was so great as to cause considerable anxiety for some time to the two medical men in attendance. The child's head was still at the pelvic brim, when she became very faint, and the surface of the body cool. The pulse was feeble, beating only about sixty per minute. There was no hæmorrhage. This patient also rallied Such cases, in a minor degree, are probably not very uncommon, and may have a more serious import than that with which they are generally regarded.

Early in the morning of the 4th of May, 1870, I was requested to see a patient attended in labour by one of the midwives of the Royal Maternity Charity. She was forty years of age, and had had five children, the last child being four years old. For some time, and especially during her pregnancy, she had suffered from a cough and shortness of breath, for which she had been an out-patient at the Metropolitan Free Hospital.

The midwife arrived at five o'clock, and labour progressed favourably for about an hour. The patient then complained of shortness of breath, and became rather livid in the face. Her appearance was such as to give the midwife much alarm; but when I arrived the child was just born, and the mother seemed comfortable. She conversed with me, and there was then no dyspnœa. Under the circumstances I determined not to disturb her by any examination, but enjoined perfect rest and left her. She rested for about three quarters of an hour without any distress, then attempted to kneel up, and to fix her elbows on

the bed. Her breath was then very short, and she could hardly articulate. She then lay down on her back, and died almost immediately.

Mr. Saunders kindly assisted me at the autopsy next day. The body was well formed and fairly nourished. On opening the chest the lungs were found to cover more of the heart than natural, owing to their emphysematous condition. There were slight old pleuritic adhesions, but the lungs were healthy. The heart was of normal size, with about the usual quantity of fat on its surface. The muscular tissue looked flabby. The right side was quite empty, and there was no clot in the pulmonary artery. The left ventricle was contracted, containing a little liquid blood.

Under the microscope the muscular fibre of the heart, although in some parts exhibiting the transverse striæ, in others showed well-marked fatty degeneration. Mr. Howse also examined a specimen, and expressed the same opinion. There was nothing specially observable in the other organs. The abdominal viscera were healthy; the uterus was free from clots; there was slight serous infiltration of the cellular tissue around the neck of the uterus.

On the 26th of May, 1869, I made a post-mortem examination with Dr. Barnes on the body of a patient of the Royal Maternity Charity, to which he was then physician.[1] She was thirty years of age, and had been confined the preceding day of her fourth child. She had been subject to a cough for a long time, was pale, and was considered by her neighbours a very delicate woman. The midwife stated that the labour was in every respect natural, except that the uterus acted very feebly, and for this she gave her some ergot of rye. There was no hæmorrhage, and the placenta was withdrawn entire and without difficulty. For two hours after the completion of labour there appeared no untoward symptoms, but then the patient became very faint, and attempted to get up in bed. Brandy was given and some ammonia applied to the nostrils. The faintness, however, continued, and she died in little more than half an hour. Autopsy eighteen hours after death. On laying open

[1] I have to thank Dr. Barnes for his courteous permission to publish this case.

the abdomen the peritoneum was found healthy. Kidneys healthy; liver lacerable, pale. The uterus was also pale on the surface, the attachment of the placenta could be made out extending across the fundus, not more to one side than the other. A layer of decidual membrane existed over the inner surface. There was nothing unusual in the pelvis. There was a little blood effused into the cellular tissue about the neck of the uterus, such as is very often found after labour from the stretching to which the parts are subjected. There were extensive, fairly firm adhesions of the right pleura, at the upper and middle parts. The lungs themselves were healthy. In the upper lobe of each lung there was a good deal of œdema, frothy serum exuding on the least pressure. The lung tissue was firm. The heart had an unusually large quantity of fat on its surface; there were no clots in either of the ventricles; the pulmonary artery was quite free from clot. Portions of the muscular tissue of the heart, showing the yellowish streaks on the surface, were examined microscopically, and were found to have undergone very decided granular change. This specimen was also examined by Dr. Pye Smith.

In November, 1870, C. B—, æt. 34, was attended in her ninth confinement from the Lying-in Charity of Guy's Hospital. Her labour was a tedious one, the uterus acting feebly. She was confined early in the morning. There was a little oozing of blood after delivery, but it was soon stopped. As she appeared faint one of the obstetric residents was sent for and gave her some brandy with a little opium. The slight hæmorrhage entirely ceased. The gentleman who attended her remained for a time, but then left; he was again sent for, and on his arrival found the patient dead. It was difficult to ascertain the exact time of death, as there had been no struggling nor any indication of impending dissolution. The husband and friends who had been in the room during the whole time were not aware when death took place. They had noticed that she was lying very quietly, but thought she had fallen into a deep slumber.

I ascertained from her husband that previous to her confinement she had frequently suffered from palpitation of the heart, with attacks of dyspnœa, and had on that account been

often obliged to stop while walking in the street, and to sit on a doorstep.

On post-mortem examination the next day we found the body not wasted, there being a good deal of fat, especially in the abdominal wall. There was no coagulum in any of the heart's cavities or in the vessels, only a little liquid blood. The lungs were healthy. The heart had about the usual quantity of fat on its surface, but, on microscopical examination, the muscular tissue was found to have undergone very evident fatty degeneration. The organs generally were pallid. The liver did not appear to be very fatty to the naked eye, but a more careful examination was not made. The kidneys were healthy. The uterus presented the usual post-partum appearances.

On the 24th of June, 1872, the obstetric resident of Guy's was called by the gentleman in attendance to a case in which there was some hæmorrhage during labour. On his arrival the hæmorrhage had ceased. The labour proceeded naturally, and a dead child was born. The uterus contracted firmly, and there was no loss of blood. Everything appeared to go on most satisfactorily, and in two hours after delivery the nurse proceeded to remove some of the patient's linen. In order to facilitate this she sat up, but almost directly she fell back and died. The woman's age was twenty-seven, and this was her second labour.

The post-mortem appearances were in every respect similar to those in the preceding cases. The uterus was contracted, and presented nothing abnormal. The abdominal viscera appeared healthy to the naked eye. The heart was small, the ventricular walls were thinner than normal. Pericardium healthy. The ventricles and the vessels were quite free from any coagula, and, indeed, contained scarcely any fluid blood. The muscular tissue was pale, but it was found impossible to take away any portions for careful examination.

Another fatal case occurred in the Lying-in Charity of Guy's Hospital, in May, 1871, in which the post-mortem appearances very closely resembled those observed in the preceding cases; but this case is omitted, as there existed a spindle-cell sarcoma of the dura mater, about the size of a hen's egg, pressing

on the brain, though it is doubtful whether this had much to do with the production of the sudden death.

The above cases are intended only as a slight contribution to a very important subject. The distress occasioned by a death so sudden, and under such circumstances, is exceedingly great; and the position of the medical attendant is one of great difficulty. It is much to be desired that faithful records of all such cases were published, including the antecedent history of the patient, and especially the state of her health during pregnancy, together with a detailed account of the post-mortem appearances.

ON THE

DYNAMICS OF EPILEPSY AND CONVULSIONS.

By J. THOMPSON DICKSON, M.B.

There is a group of nervous disorders indefinitely expressed as fits, epilepsy, eclampsia, and convulsions, commonly considered as affections of the excito-motor system, of which the pathology is often obscure, but in regard to which an erroneous impression is frequently conveyed by the nomenclature used, for the familiar terms above mentioned seem to imply that the affections so named are substantive diseases rather than symptoms, or the positive proclamations of morbid conditions, in which light alone they ought to be regarded. The importance of these symptoms ought not to be overlooked; they always mean something grave. They may be the first indications of mortal disease, such as Bright's disease; they may be the violent protest of the organism against some obnoxious irritant, such as a carious skull, carious teeth, worms, or fever or other poison; or they may indicate abnormalities of brain tissue, sometimes coarse, as abscess or tumour, sometimes minute and subtle, as microscopical changes in the cerebral cells. Nevertheless, the symptom is always suggestive of the question, What will the issue be? The question is important, not merely from a purely medical point of view, but also from its medico-legal aspect. People suffering from the affections

which go by the popular names I have mentioned often exhibit mental disturbance; and under the influence of this disturbance, which is sometimes very transient, they may commit crimes for which they cannot be held responsible. The mental disturbance may range from a passing confusion of thought to raving madness, and the permanent effect on the mind may range from slight fatuity to hopeless dementia.

It is my purpose in this paper to inquire into the dynamics of this group of nervous affections, and also to consider the physical conditions, or some of them, upon which these affections depend.

For the sake of clearness, I would in the first instance define and limit certain terms which I shall use in this paper:

"Convulsion" is limited to the muscular manifestation of the group.

"Epilepsy"[1] denotes the habit of reproducing a chain of symptoms of which the essential one is loss of consciousness. Convulsions may or may not occur in epilepsy.

"Eclampsia"[2] is the production of the same chain of symptoms as epilepsy, the element of habit being absent, and the subject either speedily dying or speedily recovering. Convulsions often, though not necessarily, attend upon eclampsia.

The expression "fit" I shall not use. It is a word of doubtful origin, probably derived from the Latin *peto* or *impeto*, to assault or attack; the term, however, is very vague.

"Excito-motor" is here used as it was by Dr. Marshall Hall, to express reflex action.

I purpose showing that excito-motor affections are the resultants of two factors—the first, loss of cerebral control; the second, an excitant. That both factors are always present in convulsion, whether the convulsion be local or general; and that the first factor is always present in epilepsy[3] and eclampsia, though the second may be so far wanting as to render the chain of symptoms, as commonly described, incomplete.

[1] *ἐπιληψία* from *ἐπιλαμβάνω* to seize or to take hold of.

[2] From *ἔκλαμψις*, a shining. Flushing of light is not uncommon in the chain of symptoms of epilepsy and eclampsia, and from this circumstance the word has been adapted.

[3] The idea that epilepsy is a disease having a definite centre, as was formerly held, has, I think, quite exploded, though it is certain the morbid states of brain in association with epilepsy are often local and circumscribed.

There is little doubt that the doctrines of Marshall Hall regarding the excito-motor function, and its residence in the spinal cord, are right as far as they go; but they hardly go far enough to explain morbid excito-motor action. The reflex function of the cord must be regarded as a normal function, and altogether distinct from the excito-motor action induced by disease or accident. This I shall endeavour to demonstrate.

The cord capable of reflecting excito-motor stimuli under certain circumstances must be considered as extending from the united thalami optici and corpora striata to the caudal extremity of the medulla spinalis.

But though the excito-motor system may be said to be limited to the cord thus defined, with its peripheral extensions, yet the location of the reflex function in the cord is not a residence wholly independent of the influence of the cerebral hemispheres, nor indeed can it be, since the connection between the convolutions of the brain and the great central ganglia[1] is so intimate that independence is impossible.

The normal influence exerted by the cortex of the brain on the excito-motor apparatus is one of control, an influence exerted more or less through the simple agency of volition or will, which presumably is capable of controlling an impulse to most involuntary movements, provided the whole nervous organism is intact. Such normal reflex acts as deglutition and ejaculatio seminis are to be excepted probably on anatomical grounds: their centres of action are, in all probability, out of connection with the cortical grey matter, or only so slightly in connection as to be almost or altogether beyond the cerebral influence.

The fact of the control of the surface of the brain under

[1] A passing word may be said for the labours of Dr. J. Luys of the Salpêtrière, Paris, whose researches go to show that the whole of the white fibres proceeding from the cells of the convolutions pass either into the thalamus opticus or into the corpus striatum; those which are commissural alone being excepted. The researches of the same author go to show that besides the fibres (cortico striati) just mentioned, the motor fibres of the medulla spinalis, together with certain fibres from the cerebellum, enter the corpus striatum; this last fact, however, has been noted by many observers, and the fibres may with a little difficulty be traced. Dr. Luys' views have long been received, according to general surmise, as the actual conditions; his statements, however, require corroboration.

ordinary circumstances is rendered obvious upon a study of the various abnormal involuntary movements which come under notice, and I have already expressed an opinion that such movements only occur and can only be excited when the controlling influence of the surface of the brain is diminished or lost.[1] The best illustration of such movements is to be seen in the jactitations in limbs paralysed by injury to the spinal cord, the reflex action being dictated and accomplished by the cord beyond the seat of injury, and therefore beyond the reach of mandates of the will; whilst experiments on rabbits go to show that perfect, perhaps the most perfect, reflex movements—or convulsions, as they are called by the authors[2]—can be excited after the surface of the brain has been sliced away, thereby depriving the corpora striata of any influence that volition might bring to bear upon it.

The conclusion that excito-motor action occurs under two varieties is necessary and irresistible. The first variety is normal, and embraces all the ordinary reflex acts, as deglutition, defecation, urination, ejaculatio seminis, and respiration, all of which, from anatomical associations, are either beyond volitionary control or feebly under the influence of will. In a minor degree also the act of walking, also the alternate movement of the arms in walking, and many other semi-involuntary acts, must be included in this category. The other variety is that which we only see in abnormal conditions, and which only occurs when the continuity between the cortex of the brain and the motor centre is dissolved, and the influence of volition thereby cut off.[3] The movements which may be excited in a paralysed limb after section of the cord above the supply to

[1] "On the Nature of the Condition called Epilepsy," 'British Med. Journ., June 4th and 11th, 1870.

[2] 'Kussmaul and Tenner on Convulsions,' c. xi, p. 69 *et seq.*

[3] Critics may say that I hereby assume that volition has a seat, but the assumption that will is located in the cineritious shell of the brain is at least justifiable, even if it be an assumption, which I doubt. There are few scientific men even among the avowed enemies of materialistic philosophy who would care to deny to intellectual operations a seat in the cortex of the brain; and volition, which is the resultant of various acquisitions, is so inseparably bound up with intellect, and though perhaps more elementary, yet partaking so perfectly of an intellectual process that it cannot upon any scientific grounds be separated from intellect so far as the seats of the processes generally are concerned.

that limb is a perfect example of reflex movement of the second kind. To the same class belong the movements of convulsions and epilepsy.

It will, I think, from the foregoing, be admitted that excito-motor action is dependent upon the presence or absence of control exercised by the surface of the cerebrum—*i. e.* that excito-motor action does not occur as an abnormal production provided the cerebral surface be perfect, its nutrition maintained, and its connection with the reflecting centres intact; but the question then may be asked, will particular instances support the generalisation? I think the proposition will bear the test well.

We may, in the first place, take into consideration the question whether the cutting off of the power of control (by excision, tumour, abscess, or other means of destruction of tissue) from a limited area of the brain's surface will admit of a limited and local reflex action. The answer is necessarily affirmative. We sometimes see anomalous and disorderly movements, such as the uncontrollable motion of a finger or toe, a limb, or one or more muscles of the face;[1] and there is no doubt that the potentiality of such lies in local and limited areas of imperfect cerebral tissue.

I have seen three cases of local convulsion in which tumour was present on the opposite side of the surface of the brain, and in several recorded cases in which auræ have been present, definite lesions of the brain have been found; and I think I may logically argue, from the fact that we have the convulsion in those parts the muscles of which are presided over or controlled by the portion of cineritious tissue damaged by the tumour or tubercle.[2] At the present time I have under observation a patient who suffers from attacks which throw the muscles of the right side of the face into spasm. These attacks are usually but not always followed by spasms of the rotators of the right side of the neck, which turn the head towards the right, sometimes sufficiently to cause the patient to look over his right shoulder. The question in such cases, of course, is

[1] See paper by Dr. J. Hughlings Jackson, 'Med. Times and Gazette,' Nov. 30, 1872.

[2] I have commented upon Dr. J. Hughlings Jackson's view on this point at page 190.

how far the local spasmodic affection is due to a limited seat of injury. In very few cases, however, is it possible to answer the question with any certainty during the life of the patient, though it may be surmised if the history records a blow, or if the general symptoms or ophthalmoscopic revelations point to the existence of a tumour. The history of the case I have given is merely that of alcoholism, still the patient may have a lesion in the left side of the brain. Indeed, it would be difficult to comprehend how so definite a local affection as that described could be due to a general condition;[1] and, though the evidence of local change in the brain is not positive, yet it would be arguing for effect without cause should it be imagined that some lesion did not exist.

A few months ago I saw a gold-beater, æt. 40, who suddenly, whilst at work, became unable to bring his hammer down upon his sheet, nor was he able to move his arm for some minutes afterwards; at the same time he became paralysed in speech. These symptoms were fleeting; within ten minutes the power of control of the arm partially returned, and the power of speech returned completely, but the man's conversation was for some hours incoherent and unintelligible. I found that the patient was suffering from albuminuria.[2] The

[1] The epileptic nature of these attacks is rendered certain from the fact that at times the patient has seizures presenting the feature of unconsciousness in a marked degree. Most cases, in which local affection occurs, develop, and from time to time display epileptic attacks; a circumstance which often obscures, and often renders the case very anomalous by directing attention to the general rather than the particular condition. Sometimes a curious and inexplicable feature crops up, which, unless the case can be followed to its end, would sometimes seem to disprove every suggestion that can be made in elucidation of the cause. I shall, by and by, consider how the general condition may arise out of the special or local.

[2] A patient was lately brought into the hospital convulsed and insensible, and shortly afterwards died. His brain and medulla were carefully examined, but no trace of any disease was obvious; but on examining his kidneys they were very small, granular, and contracted. I, however, placed the medulla in chromic acid, intending, when ready, to examine the conditions of the vessels in it. But on endeavouring to cut sections I was surprised to find that softening existed in its centre from the level of the first pair of cervical nerves, extending upwards and backwards as far as the floor of the fourth ventricle, involving in its course the inferior border of the olivary body of the right side; on the floor of the fourth ventricle it implicated the root of the hypoglossal and pneumogastric nerves of the right side, and, stretching across the raphe, partially involved the root of the

attack above described was followed by others, in which the sensory symptoms varied, ranging from a slight vertigo to unconsciousness. The patient was an only son, and his father died of cerebral hæmorrhage. In this case again, though positive evidence is wanting, yet it is impossible not to believe that a definite spot of lesion determines the local manifestation.

The development of general epilepsy or of eclampsia upon local convulsion is a common observation. The lesion of the brain will provide the potentiality, or the necessary conditions for that mobility of the cerebral circulation which is the immediate cause of the unconsciousness. The general symptom, however, will not be developed, notwithstanding the potentiality, unless a secondary cause is present to excite it.

In precisely the same manner a local convulsion will not occur without an exciting cause, however great the predisposition induced by a local lesion may be. We may take it upon anatomical considerations that the result will be the same, whether the seat of the lesion be in the grey matter of one or more of the gyri,[1] or in a corpus striatum, or in the intervening white substance (cortico-striate); for in whatever portion of this chain be the seat of the alteration, the effect must be identical—viz. deprivation of the centre from control. Of course it must not be concluded from this statement that, because there is circumscribed damage in one of the spots indicated, excito-motor action must of necessity take place.

pneumogastric nerve on the left side. The remainder of the medulla was unaffected. Dr. Lockhart Clarke carefully examined this medulla with me, and verified the facts above noted.

[1] Dr. Wilks has pointed out how that tumours of the cortex are associated with epilepsy, and of the central ganglia with amaurosis, and Dr. Bright made some observations on the subject. In my paper in the 'British Medical Journal' (loc. cit.) I pointed out the fact that epilepsy was usually attendant upon surface tumours, but epilepsy may also be attendant upon central tumours. I have seen one marked case in which both epilepsy and amaurosis accompanied a central tumour. The presence or absence of convulsion with central tumour must depend very much upon the tumour's position and the nature of the tumour—thus, it will not be accompanied by epilepsy should its situation in the corpus not involve a centre or some centres of motion. Kussmaul and Tenner's experiments (3 and 5, C. xi) in excision of cerebrum are highly interesting in consideration of this point, as indicating the special seats which, when injured, will permit of convulsive movements.

Such damage having occurred renders the affected spot capable of permitting the abnormal reflex action; but, as in the case of limbs which have been paralysed by accident or damage to the cord, the reflex movement, though potential, does not occur without something to excite it, so, in the case of a limited or circumscribed spot of injury in or affecting the corpus striatum, abnormal reflexion, though possible as a consequence, does not occur without some additional condition to act as an excitant.[1]

Of the excito-motor manifestations which may be made potential in warm-blooded vertebrates by section of the spinal cord, the attacks do not appear until excited. In all the guinea-pigs which I rendered epileptic by section of the cord, no reflex movements were manifest until excited by pinching the skin of the cheek. In the case of a rabbit, the organisation of which seems to be more delicate than that of the guinea-pig, unconsciousness could be induced by a shock, such as stamping on the floor or suddenly striking the table, but I never observed the attacks to recur without an excitant.[2]

Were it not so, any injury, however slight, to either the controlling surface, the intermediate fibres, or the corpora striata, would give rise to convulsive movements, which would continue until the patient died exhausted. I have found, in epilepsy induced by section of the spinal cord in guinea-pigs, that death will rapidly follow if the irritation be continued, and Kussmaul and Tenner[3] found that death speedily resulted in their experiments unless the circulation was speedily restored; and as a fact, in the case of the human subject, eclampsia speedily kills unless the irritation be removed.

[1] Compare Kussmaul and Tenner, ant. cit. p. 57; also Hughlings Jackson, on 'Convulsions,' pp. 42 and 43.

[2] Brown-Séquard found that the attacks occurred periodically in his epileptic guinea-pigs, though the seizures could always be brought on by pinching the skin of the cheek. (See lecture on the 'Pathology and Physiology of the Nervous Centres.') The periodicity of the attacks indicated a periodical excitement. On this point compare paragraph at page 43 of Dr. J. Hughlings Jackson's paper, 'A Study of Convulsions.' In none of my experiments in section of either a lateral half or of the whole cord did the epileptic attacks appear until at least six weeks after the infliction of the injury; and in all the animals which I killed and examined after death I found that a cicatrix had formed at the seat of injury.

[3] Kussmaul and Tenner, c. v, p. 17.

The evidence afforded by clinical observation constantly confirms the proposition that morbid reflex action does not occur until something starts or excites it. We see this in various mental states, as moral excitement, distress, fear, anger; also in several physical excitants, as ingesta in the stomach and worms in the intestines, and pressure or other irritation to the peripheral extremity of a nerve. I need hardly multiply details of cases common to general experience, but, in illustration of the influence of mental excitement, I may mention the cases of two epileptic girls, in whom attacks had been absent for several months. In one of these girls the renewed seizure made its appearance on the morning of the occasion of the Queen's visit to St. Paul's Cathedral, at the moment the patient was starting out to see the procession. The other girl went out to view the illuminations on the Prince of Wales' birthday, and was seized with an attack soon after she returned home. Cases attributed to fright and to seeing another person in a paroxysm are common enough; but in all these a predisposing cause must exist, though it may not be easy to discover it even after death.[1]

Among exciting causes are those which in some instances may be also predisposing[2] by the exhaustive influence of continued peripheral irritation. In this class also should be included those cases which seem to take their origin in injury or defect of the spinal cord.[3] This conclusion is essential in the present state of our knowledge, and follows naturally upon the common observation of the seizures which sometimes attend upon carious teeth, and which disappear when the irritation is removed.[4] I do not include in this the convulsions of dentition in infants, for in these cases I think it impossible for the seizures to occur unless the predisposition already exists.

[1] I mentioned a case in my paper in the 'British Medical Journal' in 1870, attributed to fright, in which a post-mortem examination exhibited surface tumour.

[2] There is good ground for believing that in many, if not all cases, attributed only to peripheral excitation, some hereditary predisposition exists.

[3] See pages 188 and 189.

[4] Compare case reported by Dr. Brown-Séquard, 'Lecture on Epilepsy,' p. 185.

Intestinal worms may belong to the causes which set up a predisposition as well as excite, but the fact is by no means established. Certain poisons will produce the effects; of these urea and fever poisons are the most important. Hydrocyanic acid and most of the vegetable alkaloids will produce convulsive seizures and unconsciousness, and aqueous conditions of blood will do the same. This is seen in common anæmia and chlorosis, in the watery blood sometimes attending pregnancy, and to the list of causes which predispose as well as excite ought to be added heart disease, aortic stenosis, and atheroma of the arteries of the head and neck, all of which, in the first instance, give rise to an imperfectly nourished brain (either by supplying a blood unfit for nutrition,[1] or else by rendering a short supply), and in the second place, act as irritants or excitants.

The evidence of potentiality is positive. We see an effect, and logically conclude that a cause must exist. But the effect which we see is often the most palpable fact in any given case. Potentiality takes its origin in physical conditions which may range from microscopical minuteness to gross coarseness. Let me, however, not be misunderstood. Imperfection of cerebral tissue, whether the departure from the normal standard be that of gross coarseness or infinite minuteness, will render epilepsy, eclampsia, or convulsions potential, but beyond the possibility of the reflexion the abnormality may not proceed.[2] Exciting causes are often as obscure as predisposing. Sometimes they are made manifest by an *aura*, but masked *auræ* are not uncommon. However, notwithstanding the difficulty of determination, the exciting cause must exist, or the attack could not occur. So various, and often so seemingly at variance, are the exciting and predisposing causes, that classification is hardly possible, and every case must be regarded as a study in itself.

Having sketched the necessary conditions for, and the predisposing and exciting causes of, morbid excito-motor action, I

[1] See lectures "On the Physiological Action of Strychnine," by Dr. G. Harley, Lancet,' July 7 and 14, 1856.

[2] It must be remembered that the morbid anatomy of subjects who have died after having suffered for years from epilepsy often displays conditions which are the result rather than the cause of the affection.

would now consider the proximate cause, and this, I think, in all cases is to be found in a change in the cerebral circulation—a change producing local or general cerebral anæmia.

Dr. Marshall Hall advanced the theory that epilepsy was due to impeded ebbing of the venous blood from the brain, and he represents four stages: 1st, direct or reflective irritation of the centrum spinale; causing—2nd, contraction of the muscles of the neck and glottis; producing—3rd, compression of the veins of the neck; resulting in—4th, unconsciousness and insensibility; and he says general convulsions break out as the result of venous hyperæmia of the brain, and asphyxia.

The errors of his theory are remarkable from their near approach to truth, but it is curious that he should have recorded so palpable an error in superficial and general observation as to have placed contraction of the muscles of the neck and glottis before unconsciousness and insensibility in his train of symptoms. Had he noted the fact that unconsciousness was one of the earliest of the visible symptoms, and that congestion of the face and neck was an after occurrence, he might have been led to the discovery that consciousness and sensibility disappear in consequence of cerebral anæmia instead of congestion. The venous hyperæmia which he very accurately noted results from the sudden strain laid upon the venous circulation by reason of a sudden contraction of the arterial vessels.[1]

The congestion theory advanced by Mr. Solly is less near the truth than that of Dr. Marshall Hall, though Mr. Solly's view found many to embrace it; and I mention it because his belief still has many adherents. He concluded that the cause of the attack was "a determination of blood to the head," the result of an increased action of the heart, and a simultaneous paralysis of the muscular coats of the arteries of the head, and he based his theory upon the following strange mixture of assumptions and facts:[2]

[1] The permanent effect of the venous congestion is beautifully demonstrated by the condition of various portions of the brain and cord, particularly of the medulla oblongata. The venous vessels become dilated and tortuous, and the perivascular canals become widened. The fact was first observed by Schroeder van der Kolk.

[2] 'The Human Brain; its Structure, Physiology, and Diseases,' second Edition, 1847.

1. "Increased determination of blood to any organ augments its secretions to an abnormal extent. Sudden determination to the head must rapidly increase the generation of nervous power, which in a healthy state conveys volition to the muscles, and is identical with electricity. This excessive secretion is carried off by the motor nerves, like a discharge from an electric battery, and from its quantity and excess produces excessive action of the muscles.

2. "The pulse of the carotids is exceedingly strong during the attacks.

3. "At the post-mortem examination of persons who have died during the attack, the brain has been found in a hyperæmic state."

Mr. Solly's theory is ingenious, but it is untenable, for both clinical and experimental observations furnish evidence that the actual state is precisely the reverse, for congestion, as may be very well seen in a child labouring under whooping-cough, never produces unconsciousness or any symptom like epilepsy, though much confusion has arisen in regard of this point by the use of the expression convulsion so often applied to a paroxysm of whooping-cough. Again, upon the removal of pressure which has been applied to the large vessels of the neck by way of experiment, violent congestion of the head follows, but convulsion never is a sequence. The severing of the cervical sympathetic nerves is also followed by congestion of the brain, but this congestion is never associated with convulsions. These facts, observed by Kussmaul and Tenner, I have verified by numerous experiments. Again, if Mr. Solly's theory be true, why do we not get an increase of sensibility and mental activity as well as increase of motion?

Mr. Solly's second and third grounds are based on facts which bear very different interpretations to those given by him. The strength of the carotid pulse is due to a *vis a fronte* of the smaller arterial vessels that are contracted, whilst the hyperæmia observed after death is venous and not arterial, a fact noted by Foville, who is quoted by Solly.

The question then naturally arises, if the theories of congestion which have been so frequently advanced be untenable, is the opposite condition—viz. cerebral anæmia—the essential

condition? The fact, I think, is not difficult of demonstration.

The evidences of cerebral anæmia and arrest of cerebral nutrition are of two kinds, the one positive and direct, and the other negative or secondary. The first, from observation made upon the slaughtering of animals, it being found that upon excessive bleeding warm-blooded animals became convulsed before they died. This was at first explained by the assumption that muscles contracted spasmodically when deprived of blood, in consequence of the alteration of the relation of their fibres and of the muscles to one another by reason of the pressure of the atmosphere compensating the tendency to vacuum from the abstraction of the blood. The fallacy of this view has been proved by the experiments of Kussmaul and Tenner, who have shown that deprivation of the brain of arterial blood by tying the vessels of the neck will produce all the effects as perfectly as, or more perfectly than, depletion.[1] The experiment, repeated over and over again, and with unerring certainty, establishes the first fact, viz. that cerebral anæmia produces unconsciousness and all the appearances of epilepsy. We have already seen that congestion does not induce unconsciousness or any symptom analogous to epilepsy; the conclusion is therefore irresistible, viz. that the unconsciousness in epilepsy is due to cerebral anæmia.[2]

The conclusion is, however, confirmed and rendered certain

[1] Kussmaul and Tenner, c. ii, p. 7.

[2] In further support of the view I would state that unconsciousness generally is due to the same cause, viz. arterial anæmia. The unconsciousness resulting from a blow on the head is due to the emptying of the vessels. The unconsciousness of narcotism is due, not to congestion, but to arterial anæmia. Some narcotising materials, among which I may mention chloroform in large quantities, hydrocyanic acid, nicotine, atropine, directly produce anæmia by inducing the cerebral vessels to contract. (Compare Richardson's lectures, 'Med. Times and Gazette.' See lect., July 23, 1870.) Others, as alcohol, opium, carbonic anhydride, and, in small quantities, chloroform induce carbonaceous blood, which flows so slowly, and so imperfectly nourishes the brain, that the activity of consciousness becomes impossible. Death from chloroform or morphia appears to arise from the suspension of nutrition to the brain substance. Kussmaul and Tenner are of opinion that death from chloroform during operations often arises from bleeding, but I think this can hardly be borne out. I have over and over again killed animals by rapid administration of chloroform, and, as a rule, found the brain anæmic.

by a study of the brain by Donders' method,[1] which consists in inserting an air-tight window into the skull and observing the brain through it. It is then found that on compression of the large arteries of the neck complete anæmia of the brain and membranes ensues, and this continues until the convulsions begin, when the venous anæmia partially subsides, though the arterial and capillary anæmia is unaltered.[2]

The indirect or secondary evidence is to be seen in the blanched anæmic condition of the face and neck on the invasion of epilepsy, which must correspond with the internal condition of the skull.[3] The same fact is observed in syncope and what is called fainting, and many forms of the so-called hysteria.

The invasion of unconsciousness in epilepsy and eclampsia is always sudden, and it is brought about by a sudden contraction of the smaller arterial vessels,[4] which occurs upon the application of a stimulant, either direct or secondary.[5] The convulsion in epilepsy and eclampsia is altogether secondary. What the irritation is which sets up the convulsion in the experimental cases, where we generally get violent manifestations, is not easy to determine. It may be the irritation of the operation, or it may be the secondary irritation to the

[1] Except upon examination during life, by Donders' method, the state of the brain as to vascularity cannot be satisfactorily ascertained, because the mode of death and hypostasis may alter the fulness of the vessels, and render inaccurate observations made at the earliest moment the structure can be reached after death. I have sometimes, though not always, found the brains of epileptic guinea-pigs perfectly blanched and bloodless upon removing them from the body immediately after death, and the exceptional cases throw doubt upon the result. Kussmaul and Tenner experienced the same variations, and concluded that the information afforded by such an examination of the brain was not reliable.

[2] Kussmaul and Tenner, p. 43.

[3] Trousseau, see p. 23, et seq.

[4] The suddenness of the attack is a very noteworthy feature, and much stress is laid upon it by Trousseau, who mentioned that direct irritation to the brain by suddenly plunging a knife into it was immediately followed by contraction of the cerebral arterial vessels and by loss of consciousness; also, that the same phenomena occurred when a leaden weight was placed upon the brain of a trephined animal. The occurrence of sudden anæmia resulting from direct irritation, Trousseau stated to be due to cerebral surprise ('Clinical Lectures,' p. 31); and he insisted upon the fact of the coincidence of the anæmia and the loss of consciousness.

[5] Compare Kussmaul and Tenner, c. xiii, p. 88.

corpora striata from their anæmia.[1] One point is perfectly clear: the first part of the attack—viz. the anæmia and its manifestation in loss of consciousness—may take place without any convulsions or muscular movements following.[2] It appears that the muscular manifestation depends very much upon the exciting cause and the seat of it.

In ordinary cerebral hæmorrhage (apoplexy) the extravasated blood, acting as a foreign body, at once sets up the irritation which contracts the vessels. Negative evidence at least confirms this, for when cerebral hæmorrhage proceeds very gradually from capillary bleeding, loss of consciousness may be altogether absent, the brain accommodating itself to the gradual flow. I saw one case in which bleeding into the lateral ventricles continued for three days, and on examination the ventricles contained a clot of over a pound weight, and yet the patient only became comatose shortly before death.

The injection of water into the circulation and the forcing of water under the dura mater will induce cerebral anæmia and unconsciousness. As a more valuable observation, there is that of Brown-Séquard, upon ligature of the renal arteries, the result of the retention of the urea in the blood being the induction of eclampsia by the irritation and contraction of the cerebral vessels. It remains only to repeat this experiment under the method of observation adopted by Donders.

Of the changes I have found associated with abnormal excito-motor action, by far the most common is atrophy, and in most of the brains which I have examined microscopically, from cases in which epilepsy or convulsive disease occurred, and when no other condition was present, I have at least found atrophy. The cells in atrophy become filled with pigment, lose their sharp contour, and lose their caudate prolongations; the cell contents then agglomerate; afterwards the cell wall disappears, and the cell contents fall asunder; in addition to this, the perivascular spaces usually widen.

[1] It has been attributed to the alteration in the pressure within the head, but Kussmaul and Tenner found that the result obtained equally upon tying the vessels of the neck whether the cranial walls be intact or removed; so that the convulsive manifestations cannot be due to disturbance of the balance between the pressure of the circulation in the brain and that of the atmosphere.

[2] My own experiments, 'British Med. Journal,' June 4th and 11th, 1870.

Examples of this are to be found in the majority of the subjects who during life are called "epileptics;" in many cases of convulsive disease following blows on the head; always in progressive paralysis as found in the insane, in which abnormal excito-motor manifestations are rarely if ever absent; and the same state is also found associated with coarse conditions, as tumours.

Tumours, again, predispose to abnormal excito-motor action, by destroying or cutting off the control exercised by the surface cells. A central tumour does not as frequently set up the excito-motor conditions as one on the surface of the brain, though central tumour does sometimes set them up. It seems, however, to depend very much upon locality, and upon the solution or non-solution of continuity of the fibres between the cortex and corpora striata, and also upon the presence or absence of atrophy.

Surface tumours, whether of the brain itself or its membranes or of its osseous covering, are very generally associated with excito-motor manifestations, in consequence of the direct destruction of surface cells. It must, nevertheless, be remembered that the destruction of the surface control is only one element in the production of abnormal excito-motor action, and though the surface control may be removed by destruction or waste of tissue, and a potentiality of morbid excito-motor action induced, yet the manifestation will not appear without an excitant.

The same remarks apply to abscess as to tumour. Alterations in the calibre and also in the tissue of the cerebral vessels, whether of internal deposit as found in syphilitic vessels, or of outside thickening as seen in alcoholism, are common in the brains of epileptics.

The morbid conditions found in the spinal cord in association with epilepsy are important, but I think that they can only be regarded as the origin and source of changes in the brain which provide a potentiality, and should be classed with the peripheral causes.

Brown-Séquard, from a discussion which took place in the French Academy in 1865, seems to have modified his former views in some degree, as in that discussion he referred convulsions to morbid conditions of the spinal cord rather than of

the brain; and he based his conclusion upon the fact that the convulsive phenomena will continue after removal of the brain (respiration being maintained by artificial means). But I would ask if this fact proves anything more than that involuntary movements may be induced in the muscles after the control of the cerebrum has been removed?

What the mechanism in the production of epilepsy by section of the spinal cord is, I cannot say positively, though I think there is some reason for believing it to be cerebral atrophy, the result of exhaustion from constant irritation.[1] In the discussion above alluded to, M. Hardy and M. Ricord threw doubt upon the epileptic character of the attacks produced by section of the cord in guinea-pigs, and, referring to clinical observation, asserted that similar effects do not occur in man after accident to the cord. There is, I think, however, some little deficiency in the observations of M. Hardy and M. Ricord on this point, for cicatrices of the cord in man do produce the conditions necessary for the phenomena of epilepsy.[2] Again, although injuries to the cord in man do not always produce epilepsy, the fact is of no importance, for the widest difference exists in the susceptibility of animals to develope the phenomena after section of the cord. They are easily induced in guinea-pigs; I have only once succeeded in inducing them in a rabbit. Again, it is not any or every injury to the cord that will produce the effects, and accident to the cord such as would induce the conditions for general excito-motor action in man must be so rare that the association between the injury and the epilepsy might escape notice, unless the observer should be on the alert for it. Again, convulsive attacks in man in association with injuries to the head are

[1] I am the more induced to believe this from the fact that the potentiality of epilepsy dies out if the animal lives long enough, so that it would appear that as the irritation subsided the brain recovers its control.

Brown-Séquard succeeded in breeding guinea-pigs subject to epilepsy from parents in which he induced epilepsy by section of the spinal cord. I succeeded in breeding from such parents, but my young guinea-pigs were not affected with epilepsy. The fact, however, of its appearance in those bred by Brown-Séquard proves nothing more than that the impression in one generation may be transmitted as a habit in the next, and that any imperfect conditions of nervous matter in one generation may be reproduced in the next.

[2] Compare Kussmaul and Tenner, c. xiii, p. 86.

common enough, and they tend to show almost an extreme tendency in the human nervous centres to develop the potentiality to morbid excito-motor action. Certain actual conditions have yet to be ascertained, though every advancing step tends to the confirmation of the statement laid down, that the proximate cause of the attack is cerebral anæmia and arrest of the brain's nutrition, and that the muscular manifestation is the result of a loss of cerebral control.

Dr. J. Hughlings Jackson, who has long and carefully studied the subject, has most kindly favoured me with an explanation of his views, which accord with my own up to a certain point—viz. that in the affections known as epilepsy and convulsions a pathological condition (local or general) exists in the cortical shell of the brain. As I understand Dr. Jackson's view, he would maintain that from this pathological seat discharges are sent out, which are distributed to certain muscles in the case of local affection, and to the muscles generally in the case of a general affection. This seems very like the explosion of nerve force as advanced by Solly. I would rather maintain that when the control over certain muscles is lost or diminished by destruction or injury of a portion of the surface of the brain, involuntary or convulsive movements will occur in those muscles from reflex excitation.

Dr. Jackson's suggestion of discharges[1] is the idea which is not clear from my point of view. The muscles contain a power of contraction in themselves, irrespective of mandates from the cerebrum, and convulsive movements may be induced in a warm-blooded animal after the whole of the cerebrum has been sliced away. Dr. Jackson uses the expression instability—I have used the term mobility—I presume to indicate the same abnormal tendency; but Dr. Jackson seems to regard that tendency as a power which can command or generate action in the muscles. I regard the tendency as the outcome of weakness; a portion of brain, having lost its control, permits of action which it has become powerless to restrain.

It now remains merely to recapitulate the classification of the affections which occur from loss of cerebral control:

[1] See Dr. Jackson's paper, 'Med. Times and Gazette,' Nov. 30, 1872.

First form of affection—Local; or loss of control over a portion of a corpus striatum, from circumscribed damage or deterioration of the surface of the cerebrum, or the cutting off of the continuity of a portion of the surface shell of the brain from a corpus striatum. This will provide the necessary conditions in the corpus striatum for the potentiality of local excito-motor manifestations, and local convulsions will result whenever an excitant calls forth the excito-motor action.

Local convulsion may occur without loss of consciousness, but the cerebral conditions which allow the convulsion are always sufficient, provided the stimulus be powerful enough to set up a general irritation of the brain, to induce cerebral anæmia. General convulsions will then succeed, but this must depend upon the presence of a sufficient stimulus.

Second form of affection—Epilepsy; general loss of control by cerebrum over the corpora striata, from a general pathological condition of the surface of the brain. This form of affection exhibits itself by sudden contraction of the cerebral arterial vessels and loss of consciousness whenever stress or an excitant is brought to bear upon the brain. General convulsions or local convulsions may follow in course, according to the presence or absence of a stimulus or of a spot of local degeneration.

Third form of affection—Eclampsia; a general loss of control exactly resembling epilepsy, but due to a temporary cause, setting up direct or secondary irritation, to depletion or to the influence of poison.

ON

LABYRINTHINE VERTIGO; SOMETIMES CALLED MÉNIÈRE'S DISEASE.

BY JAMES HINTON.

IT has long been understood that certain inflammatory affections of the tympanum and parts adjacent give rise to grave disorders of the brain; and attention has been called also to symptoms simulating cerebral affections which are due to pressure of cerumen, or other accumulations in the meatus, apparently through their pressure upon the expansion of the auditory nerve.[1]

Besides these two classes of cases, however, there exists a third—very numerous, and apparently embracing several varieties—in which some of the symptoms of formidable diseases of the nervous centres, especially giddiness, vomiting, and staggering, have their origin in affections of the labyrinth. To some forms of this affection Ménière first drew attention;[2] and the subject has been subsequently pursued by Voltolini, Trousseau, Moos, Politzer, Schwartze, Knapp, and others. In spite, however, of the industry that has been brought to bear on the subject there remains much that is obscure, as must be the case, indeed, until dissections have demonstrated the presence or absence of morbid conditions, which at present rest on inference or analogy. A few post-mortems have been

[1] Mr. Toynbee, 'St. George's Hospital Reports,' 1865.

[2] 'Gaz. Méd. de Paris,' 1861.

recorded; one, often quoted, by Ménière, of a girl who caught cold whilst menstruating, became suddenly deaf, suffered from giddiness and vomiting, and died on the fifth day. No disease was found, except a kind of bloody exudation in the canals and vestibules. Politzer and Voltolini also have reported cases of death after fracture of the base of the skull, extending through each labyrinth, in which there were similar symptoms, and extravasation was found in the semicircular canals of one or both ears.

The experiments of Flourens in respect to the effects produced by injury of the semicircular canals furnish, of course, the physiological ground of the view which locates the cause of the symptoms in these organs; but, as remarked by Knapp, the great impairment of hearing, and especially the marked loss of power for hearing certain notes of the scale rather than others which sometimes exists, denotes that the cochlea also is involved.

It is not my intention in this paper to go fully into the various forms of this affection. This has been ably done by Dr. Knapp, of New York,[1] who, in an exhaustive discussion, classifies them as being, probably, either *hæmorrhagic; serous exudative;* or *simple* or *purulent.* The cases I shall relate will refer to the two former classes only; the class termed purulent are either cases of fracture of the petrous bone, or other pyæmic affections, or severe attacks of fever, with symptoms resembling cerebro-spinal meningitis, occurring chiefly in children, but passing off and leaving no permanent result but intense or even total deafness.

Of the cases termed hæmorrhagic or exudative the following is, for the most part, a characteristic example.

Case 1.—*Great deafness on the left side, beginning after attacks of vertigo and faintness three years ago; tinnitus twelve months; tympanum healthy.*

D. W—, æt. 50, a perfectly healthy man and of healthy family, with no tendency to deafness. About three years ago he had fits—five or six, at short intervals—of giddiness and

[1] 'Archives of Ophthalmology and Otology,' vol. ii, No. I, p. 204.

vomiting, which he had never suffered from before. He staggered, and thought he was bilious. On such occasions he recovered in a few hours. His medical attendant stated that the fits were like fainting; and he ascribed them to overwork. They mostly came on in the evening, and in the morning the patient was well. They reminded him of sea-sickness. There was nothing to draw attention to the ears, but during their occurrence he noticed him to be deaf on the left side. The patient did not discover this till afterwards. After an interval of two years, about twelve months ago, a singing noise in the ear came on suddenly, and has continued ever since; there were no fits or giddiness at that time, but he had been worried. The membrane is perfectly healthy, and to all appearance the cavity of the tympanum. Throat healthy. With the right ear closed, only words spoken in a loud voice near the left ear are heard. Watch (about four feet hearing distance) not heard. The tuning-fork on the teeth heard well, but only on the right side. Music sounds natural. *On exhausting the air in the external meatus, so as to draw the membrane outwards, the tinnitus was decidedly diminished for a few minutes.*

The following case also is of a similar character, though the aural symptoms are slighter:—

Case 2.—*Repeated attacks of giddiness, with intermittent deafness; brought on also by quinine.*

L. C—, æt. 54, a man of fair constitution, with no deafness in the family; seen first on May 5, 1867. For fifteen years he had been more or less deaf in the right ear, before any symptoms of illness; but for the last three months had been dyspeptic, suffering from nervous exhaustion, with frequent attacks of nervousness, vertigo, and sickness. For four or five days had felt better, but had noticed for the first time a rumbling noise in the left ear; yesterday he found that his hearing on that side also was impaired. In the right ear there is a throbbing with the pulse, which has existed long, but not from the beginning of the deafness. The right ear feels dull and dead all round. He does not hear better in a noise. Watch, right, contact; left, 12 inches; and on right

temple. The tuning-fork not well heard on the head; loudest in the better ear (the left), in which also it becomes louder on closure of the meatus. Both membranes were healthy and tubes free. Change of scene was advised, and after three months his health improved, and the hearing of the left ear seemed perfectly restored. He then had ague, and took quinine, but in twenty-four hours the deafness returned, but abated again in two days after discontinuing the quinine. He had a few slight attacks of vertigo. About the beginning of October he had influenza, which affected his hearing transiently. On the 16th the watch was heard at half an inch on the right side, and at 15 inches on the left (a slight improvement); but he noticed that he could not sing in tune. Music sounded natural. Appearances as before.

The patient was not seen again until the present November. He stated that his health got worse for a time. Iron and Pot. Bromid. were tried with little effect; slight attacks of vertigo were present; on one occasion he was very giddy and sick, and could not walk alone; hearing bad. He then wore a Pulvermacher's chain around the waist; pustules were formed, and about that time he became better, and was not ill again till a month ago. At that time he felt suddenly a sinking in the right leg; it was but momentary, but it left much depression for some hours. Quinine was given for ten days, and deafness again returned in the left ear, and an attack of swimming in the head followed, with sickness, lasting about an hour. For the last week has had swimming in the head, but no tendency to turn to one side rather than the other. In both ears he has "the sea roaring and the fulness thereof." The throat is somewhat congested, as is usual; the sight good. The condition of the ears as before; he converses by aid of the left ear, when near, without difficulty, and hears a loud voice near the right. Is often more deaf on waking. The sounds of various tuning forks are heard alike on both sides, and he can sing short strains correctly, but cannot repeat the notes of a piano. Suction on the meatus had no effect on the tinnitus.

In these cases there appears very little to indicate the cause of the affection. In the next a probable cause suggests itself.

CASE 3.—*Frequent giddiness and vomiting, with staggering and tendency to turn to the left in walking; deafness of each ear; restricted perception of musical sounds; no apparent disease of tympanum; old disease of sternum.*

N. W—, æt. 51, first seen in July, 1871; of moderately healthy family, free from tendency to deafness, but of strumous constitution; a widower seven years; never syphilis, until a mild form three years ago, which appeared to have no influence on his other symptoms. Since he was a child (he believes ever since measles) he has had ulcerated swellings over the sternum and two or three of the ribs of the right side, frequently discharging; no bone has, to his knowledge, come away. For many years, certainly more than twelve, has had frequent fits of giddiness, often with vomiting, and sometimes falling; seven years ago fell and broke his right arm. For about twelve years the left ear had been deaf; the right ear had become so a few months since, which he first discovered by finding that music sounded out of tune, which he had not noticed in regard to the left ear. The tympana were healthy. Watch, right, contact; left, not heard; a loud click of the nail heard at 20 inches. Tuning-fork heard badly, most in the right ear. Iodide and bromide of potassium were prescribed by Dr. Wilks.

On November 29th of this year he consulted me again. The hearing had changed slightly, the left ear having become the better, the watch being heard at one inch on the left side and not at all on the right; the tuning-fork was heard most on the left side (that is, still on the better one). He habitually wakes at three in the morning, with feelings of intense depression, and retches. Has fallen several times from giddiness, but not during the last two or three months till five days ago. He does not walk straight, and tends to turn *to the left side*, and to fall forwards. Is not more deaf after the attacks, nor is there more tinnitus. This, however, is constant, like a shell. Suction produces no effect on it. A few months ago he had a distinct musical note in both ears. The discordant sound of music has diminished, but the hearing in this respect presents marked peculiarities. He can accurately repeat the

note of a tuning-fork held to the left ear, but on the right side he says that it sounds much lower. *g* of the third octave is heard distinctly as *c* of the octave below, or twelve notes lower; with other notes there is a similar result, but less distinct. On testing the right ear by the piano, he said he heard g'''' more clearly than any other note, and with his back turned at a short distance picked out that note as the only one he heard. This would be explained, probably, by the fact which Helmholtz has shown, that the resonance of the meatus is called into play by notes of this octave, especially by e'''' and g'''', and which, therefore, sound louder than other notes.[1]

But the distinct hearing of one musical note as another, a difference of which he was quite conscious, indicates an affection of the cochlea, and appears to be explicable only on the view, also propounded by Helmholtz, that the arched fibres of Corti's organ respond to various notes. Cases have been reported in which all the notes of the scale were heard a semitone higher on the one side than on the other, and these have been explained by an increased pressure of the fluid on the side on which the sound seems lower, upon the idea that the lamina being thus put on the stretch, a fibre which would normally respond to a lower sound reacts, owing to its increased tension, to a higher. It is obvious that this explanation, however, is not sufficient in this case, and that some more partial deranging causes were present. I do not know that so great a sinking of the note, as from g''' to c''', has been observed before.

With regard to the nature of the affection of the labyrinth, some ground for conjecture is given by the long-standing periosteal affection of the sternum and ribs. Chronic affections of the lining membrane of the labyrinth, resulting in thickening and increased development of bone, have been met with on dissection, and in two cases of deaf and dumb children I found small bony tumours of the scalæ of the cochlea, in one case obliterating the fenestra rotunda. Upon the supposition that some such tendency existed in this case Dr. H. Weber advised iodide and bromide of potassium, and the use of the Kreuznach water. The tendency to turn to the left in walking, that is, towards[2] the worse side, was distinctly marked.

[1] 'Lehre von den Ton-Empfindungen,' p. 175-6.

[2] The observations on this point are as yet not consistent (see Knapp, loc. cit., p. 278).

Symptoms similar to those described occur in the course of inflammatory affections of the tympanum, due in all probability to secondary disturbances of nutrition in the labyrinth. The following is an instance of this kind, for the completer history and examination of which I am indebted to Dr. Hughlings Jackson.

CASE 4.—*Chronic catarrh; tinnitus and slight deafness, with hypersecretion in the tympanum; sudden attacks of giddiness and sickness.*

Nov. 7, 1871.—B. A—, æt. 42, of fair constitution; no hereditary deafness. Was "bilious" as a boy, and has suffered from dyspepsia. Two years ago was under Dr. Mackenzie for "chronic sore throat." For about three months has suffered from singing and fulness in the left ear. Watch, right, 3 inches, left, 1 inch. Tuning-fork on vertex not perfectly heard, *loudest in the left* (*the worse*) *ear*. The membranes were slightly white and opaque, especially on the left side; no increased vascularity visible; Eustachian tubes pervious. Small touches of blistering fluid were advised, and a warm solution of carbonate of soda with chlorate of potash to be syringed through the nostrils, and to the right ear a solution of perchloride of mercury, gr. j, with Ether Sulph., ʒj, in glycerine, ℥j.

On Dec. 28th he reported himself as somewhat better.

On the 3rd of June, 1872, the symptoms were not improved, and on testing by the tuning-fork on the head it was found that it was no more heard best on the left (or worse), but on the better side; the reverse of that which had been the case (and which the patient distinctly remembered) on the first visit.

No mention was made of giddiness, or any similar symptom, but on his subsequently consulting Dr. Hughlings Jackson, the following history was elicited.

In November, 1871, he was walking home before dinner in good health, when he suddenly felt ill, and said to a friend, "By Jove, I am very giddy:" he could not walk straight; the feeling seemed to affect his legs "as if the ground were

moving; when he turned his head to look behind he was worse; did not feel sick till he reached home; was better after lying down for half an hour, but when he got up he felt sick and giddy; no vomiting in this attack; the next morning he was well. In May and June he had two attacks in the night; he woke up feeling very giddy, and vomited. The attack lasted about an hour, after which he slept, and in the morning was well.

In this case, coincidently with the attacks oı vertigo, there was a marked change from a condition indicative of a sound to one indicative of a diseased labyrinth, as tested by the tuning-fork placed on the head. But there was no connection in the patient's mind between the condition of the ear and the attacks, nor were my own thoughts at that time sufficiently alert to induce the inquiry; a secondary affection of the labyrinth in old-standing catarrh of the tympanum being unfortunately of very frequent occurrence. But the question arises, How often, when this secondary affection ensues, would it be found, on careful examination, that it had been attended with more or less liability to the symptoms above described? Perchance often, as here, the physician is consulted for one aspect of the same disease, and the (so much tempted to forgetfulness) specialist for another? On the other hand, it is possible that as this lesion of the labyrinth (be it what it may) appears so often to arise without any disease of the tympanum, it may have been in this case merely a coincidence. If the attention of physicians were fairly directed to the part which the semicircular canals play in disturbances of equilibrium, many questions, probably, would soon be placed in a clearer light.[1]

[1] Goltz (in Flueger's Arch. f. Physiologie,' 111, p. 172; quoted by Brunner in Archives of Ophthalmology and Otology,' II, I, p. 332) endeavours to explain the phenomena, ascribing to the canals and their ampullæ a special function; he supposes "that the nervous terminal apparatus of the ampullæ responds to excitation by pressure or tension, thus resembling the special cutaneous nerves for the transmission of impressions of weight. The fluid of the semicircular canals will, according to well-known physical laws, most forcibly distend the inferior portions of the walls, thus causing a definite form of nervous excitation for every position of the head." But it is evident that great doubt must rest upon this view. Where the canals have been imperfectly developed, *e.g.*, there does not appear to have been lack of power of motion.

Any of the "fevers," or syphilis in rare cases, may induce sudden abolition of the hearing, apparently from affection of the labyrinth; and, as is well known, hæmorrhages and other disorganising processes within its various parts are not unfrequently met with in fatal cases; while, on the other hand, the constant recovery from deafness occurring in the course of fevers shows that it is still more frequently a result of much less serious changes. But the disease which most often produces permanent abolition of hearing without apparent affection of the tympanum is mumps. Unfortunately dissection has as yet thrown little light on its pathology. For the most part the tympanum in these cases appears perfectly healthy, and the loss of hearing is the only symptom at all connected with the ear. But in the two following cases an affection of the middle ear seems also to have been present.

Case 5. Nov. 1st, 1872.—Miss A—, æt. 18; healthy, but slightly dyspeptic, and especially unable to eat a pear. Heard perfectly until seven weeks ago, when she rode six miles in an open carriage on a damp evening; the right ear was exposed, and she felt the cold. The next day the mumps appeared, and on the following a tinnitus occurred in the right ear; there was slight pain in it also, and a little moisture in the meatus. *She was very sick.* The sound of a piano pained the ear; it seemed too loud; this has since abated, but a constant singing in the ear has remained. Tympanum and throat healthy. Watch 40 inches on the left side; on the right a loud click of the nail was heard very close to the ear. Tuning-fork heard well; loudest on the unaffected side.

Case 6. April 9th, 1868.—H. L—, æt. 13; mother and one brother hard of hearing. At Christmas had mumps, and the left testicle swelled. Since then the left ear has been deaf; there was tinnitus in it for one day, but no severe pain. The tinnitus recurs occasionally. Hearing good on the right side; the left needed a raised voice, and the click of the nail was heard best only at 3 or 4 inches. *Tuning-fork heard best on the affected side.* Each membrane bright, but thin, the promontory and stapes being very visible; the left seemed a

little the more concave, and on inflation it yielded more in the upper and posterior portion than the right.

In the cases above reported (with the exception, perhaps, of the last, in which the tuning-fork is best heard in the affected ear), the prognosis as regards the recovery of the hearing is in the last degree unfavorable, and this seems to be the experience of all who have written on the subject. But there seem to be some other cases which suggest that these affections may exist in very various degrees of intensity, and that probably the cases which have hitherto chiefly attracted attention are the residuum, as it were, of a much larger number, less severe, and escaping observation through taking a favorable course. If it be so, it is very important even as regards the diagnosis; for the severer cases, utterly incurable as they have proved themselves, naturally suggest to the observer irremediable causes. But a wider induction may possibly lead to a juster diagnosis, one in which a greater place will be ascribed to causes of disturbance less visibly mechanical. Some three years ago a surgeon, himself well acquainted with diseases of the ear, came to inform me that he had been suddenly attacked with tinnitus and loss of hearing in the left ear. He was a strong man, aged 30, hearing fairly well until the day before, though he remembered as a boy having some affection of one ear. He had been very much overworked, and on waking one morning found himself extremely deaf in the left ear, and with a loud buzzing tinnitus. The tympanum appeared perfectly healthy; the tuning-fork placed on the head was heard only on the non-affected side. Our common opinion was that the hearing was hopelessly lost, and a slight hæmorrhage in the labyrinth suggested itself as the most plausible hypothesis. In the course of four or five days, however, the symptoms gradually disappeared and have not returned.

Another case, occurring in a lawyer subject to great overfatigue, with a larger number of symptoms, ran a more protracted but not less satisfactory course.

CASE 7.—*Attacks of giddiness and vomiting; affection of hearing on both sides; lack of control over the muscles of the eyes; recovery.*

May 7th, 1863.—S. W—, æt. 38; a strongly made healthy man; was delicate and "nervous" as a child; used to walk in his sleep, and had intense headaches. About Christmas last, having previously had no symptoms connected with the ears, he had taken a warm bath, and had experimented as to how long he could keep his head under water; the next morning he woke with loud tinnitus in the right ear; two days after a plug of wax was syringed out by an aural surgeon, who pronounced the ear healthy, and the noise ceased; but the next morning it was as bad as before. The sounds were like those of muffled machinery, and interfered with sleep. On Christmas day, while the tinnitus was better, he felt ill and giddy, and after eating a little turkey, vomited "with feelings like those of dissolution."

Since then he has had six or eight of these attacks, some very severe, always on rising, and lasting the whole morning. The hearing was always worse at these times. The last occurred two years ago.

After the first attack he took quinine and rested, but without benefit for a time, the left ear becoming also affected in a less degree. Gradually, however, the noises abated, though any exercise of the ear or overwork would bring them on. As it became less the sound seemed to connect itself with the rhythm of the circulation; when lying on the side it would cease. He could also obtain a momentary cessation by pressing the tragus into the meatus, or by rapidly withdrawing the finger from the meatus. When at its height every sound was painful, seeming to be heard with morbid intensity. Watch heard each side 10 inches, but the voice not badly. He does not think that he is deaf. Membranes, throat, and tubes healthy. Tuning-fork not heard perfectly; closing the meatus increases the sound.

His sight is good, but for many years, when from any cause he has not been perfectly well, his eyes are apt to diverge, so that he sees double any object on which they may be resting

without his consciously "looking" at it; that is, the unconscious convergence of the eyes is liable not to be performed. This divergence of the eyes is visible to others, and has been remarked to him; the first time several years ago.

During the years 1865-7 he was subject to varying and sometimes considerable deafness on the left side, and an excess of wax would form occasionally in the right, and require removal. There was never any sign of disease of the throat or mucous membrane of the tympanum; but while the left ear was the worse there was a slight desquamation of the left meatus, and the membrane appeared somewhat the more concave of the two. The hearing is now fairly good; best on the right side; he suffers very little from the tinnitus; but any over-exertion of mind will bring it on; the sound is often like bells.

In this case several of the most marked symptoms of Ménière's disease were present—vertigo, sickness, tinnitus, and deafness,—yet the recovery has been almost complete.

Nerve-fatigue appears as a direct cause; and so far as the tinnitus is concerned, the precedent and concurrent affection of the muscles of the eyes, especially of the left, suggests the mode of its action. Was not the tinnitus due to muscular spasm?

Although there at no time existed the characteristic *clicking sounds* which sometimes accompany spasmodic contractions of the tensor palati, and have been shown by Politzer to depend on the drawing apart of the lips of the Eustachian tube; nor similar sounds, accompanied by visible motion of the membrane, which are due to contractions of the tensor tympani, the symptoms, nevertheless, appear to me to point to disordered muscular action as their chief cause. And this was also the patient's very decided feeling. It is true no other disorder of any branch of the facial could be traced, yet with the tendency to disordered muscular action that existed, it is not hard to suppose that some slight irritation of the tympanic mucous membrane induced an irritable or (more likely) paralytic condition of the stapedius muscle. Among the reasons for this view are—the suddenness with which the symptoms would occur, ceasing as suddenly; a peculiar feeling of tension, as if in the membrana tympani (sounds would feel painful sometimes, as if

striking upon a non-elastic membrane); any *use* of the ear would at once increase the tinnitus; and suction on the meatus would always give momentary relief. In the first case here reported, suction also relieved the tinnitus, and as a common symptom it serves perhaps to link together two forms of disease which otherwise present many curious points of similarity and contrast. It seems an interesting question whether to any extent, and to what, the symptoms in well-marked cases of Ménière's disease may depend, in fact, on muscular conditions. In the greater number of cases suction has no effect.

Other cases of tinnitus, coexisting with transient affections of the motor muscles of the eye, have come under my observation, all of them connected with nerve-exhaustion; and in the 'American Journal of Medical Sciences,' April, 1863, is reported the case of a married lady, in good health, but delicate and subject to cold hands and feet, who, eighteen months before, after studying, had been attacked with double vision, the eyes being drawn to the left downwards. Twelve months afterwards tinnitus came on in both ears. After nine months of hygienic treatment the tinnitus was diminished, the eyes remained the same. The left eye, on examination with the ophthalmoscope, was found normal.

In the following case the symptoms of an affection of the cochlea are very marked, but great improvement rapidly took place.

Case 9.—*Sudden partial deafness, with anomalous hearing of musical notes; previous neuralgia, ceasing on extraction of teeth; improvement.*

Nov. 25th, 1867.—H. D—, æt. 30, teacher of music; pale, but healthy; no hereditary deafness. For ten years has suffered much from neuralgia of the face, alternately on each side, but never in the ear. Was getting worse until July last, when he had ten teeth extracted, and since then has been free. The ears were well until a fortnight ago. On Sunday he had conducted two services as organist, but was as usual. On going to his first lesson on Monday morning, he found that his hearing was dull, and he thought that the upper notes of the piano were out of tune. Now "he hears the harmonics

with the high notes, making the sound not true." The lower notes give him a drumming through his head; and with the lowest is a vibrating sound, as of a loose string in the ear. Constant tinnitus like a shell; feels as if there was a hand over the right ear; does not hear better in a noise. Is very short-sighted. A small piece of wax has been syringed from the right ear. Watch, right, 14 in., left, 40 in. Tuning-fork not perfectly; best on left side; closing the meatus makes it louder. Membranes bright, natural curve, very transparent, the right a little the more so; they yield slightly on inflation, with slight increase of hearing for the moment; a feeling as of a bladder in the right; no feeling in the left. Throat slightly relaxed. On the harmonium there was a drumming with the bass notes; the middle ones had a "mist" over them; the upper ones were the clearest; but from c'' upwards he heard distinctly two sounds—an added harmonic; b' flat sent a shock or beat very strongly into the ear,—"made something vibrate in it;" a' and a' flat have a similar effect. (Various tuning-forks seemed to produce the same results; but a piano did not.) Both ears appeared to be affected alike. Rest was advised; a gargle of iodine; a liniment; and ferro-citrate of quinine, with cod-liver oil.

On Jan. 22nd, 1868, two months after, he reported that he could not rest at first, but in about fourteen days all the peculiar sensations ceased. A dulness of hearing has continued in the right ear, but less than it was, and varying; worse in very cold weather. Watch, right, improved to 30 inches, left as before. His own voice sometimes sounds very loud in the right ear, and less often other persons' voices also. This is never so with music.

At the present date this patient continues free from serious trouble. He says—"After I last saw you, in the course of a few weeks my hearing gradually became better. If I am excessively tired I now sometimes feel something like a bladder forming in my right ear. I notice also at times that a very loud sound in a confined space will produce a similar effect, passing away with the cause, but often leaving a headache. Any discordant sounds or loud shouting will produce the same effect."

In the description of this case the advantage of a musician's analysis of his own sensations of sound is obvious; but to speculate on the causes of them, in the present state of our knowledge, hardly seems attractive. The hearing of naturally inaudible harmonics would seem to indicate an increased sensibility to certain very acute sounds, as if, perhaps, the conditions which deadened the response to certain sounds were more favorable to the reception of others. The peculiar sensibility to one note of the scale does not, in this case, correspond with the resonance of the meatus. The absence of giddiness or vomiting might be held to imply that the lesion was limited to the cochlea; in which case it could hardly be ascribed to a permanent change in the fluid pressure. The recovery, except so far as the dulness of hearing was concerned, took place without rest, and the facial neuralgia, which seems sometimes most seriously to affect the auditory nerve, had ceased for ten months before the aural symptoms began.

QUERIES IN THEORETICAL PHYSIOLOGY.

No. II.

By JAMES HINTON.

If we are told that water consists of O and H, it is obvious to reply that this is an incomplete account of the phenomena. O and H in forming water give off a large amount of force (the expression even if antiquated is still intelligible); and in order to obtain these gases from water an equal amount of force must be introduced. In other words, O and H are not the mere equivalent of water, they are water + force; perhaps it were better to say water + *tension*. Now, the O and H that would form a certain amount of water form also, with the addition of carbon, a certain amount of starch. But starch differs from water, among other respects, in this, that while in water force (or tension, or motion, or whatever name is preferred) is absent, in starch force is present. Starch is, in this respect, nearer to O and H than water is; these gases enter into starch with less change than into water.

My question is then, Ought not the force which is present in starch (as distinguished from water) to be regarded as *the force*, or some of it, which is present in O and H?

It is curious, in respect to the operation of the human mind, that while these facts are obvious: that O and H contain force (or motion), that starch also contains force, and in this respect agrees with O and H, while water differs from both in the

absence of force, a special force has been supposed in the starch. The reasonable supposition would be, surely, that O and H had managed, in starch, to unite with less change, retaining some of their force; perhaps by the aid of the carbon. It is easy to imagine this with the help of a rough mechanical illustration. If two pieces of wood are pressed together, so soon as the pressure is withdrawn they remain merely in contact; the "force" of their impact having been "given off;" but if an elastic substance be placed between them such substance will, as it were, "take up" the force, and hold it, as in reserve: the body thus formed "contains force." Does the carbon act in the same way as a reservoir for the "force" of the O and H, itself modified as it necessarily must be by the part it thus plays; made prone, perhaps, to changes which else would require a greater force *ab extra* to initiate them?

ON THE

ARTIFICIAL FORMATION OF ORGANIC SUBSTANCES.

By Dr. HENRY DEBUS, F.R.S.

There is, perhaps, no chemical problem of greater interest to the physiologist than the constitution of the organic substances which form part of animals and plants. By means of this constitution we explain the formation of such substances and their decompositions, and from it obtain indications how to prepare them by artificial means. If, on the other hand, the synthesis of an organic body has been accomplished, we possess one of the elements necessary for the determination of the chemical constitution. On account of these relations the artificial formation of organic substances has always been regarded as one of the most interesting chemical operations. Within the last twelve or fifteen years our progress in this field of research has been so considerable that we are justified in entertaining the hope that we shall be able, at no very distant time, to form in the laboratory all those complex compounds which hitherto have only been known as the products of vegetable and animal life. In placing before the readers of the 'Guy's Hospital Reports' an account of a few experiments made in this direction, in the laboratory of the hospital, it will, perhaps, not be without interest to add a few historical notes, together with a description of some of the methods used and the results obtained in this department of physiological chemistry.

Until the year 1828 it was believed that organic bodies could only be formed under the influence of the vital force in animals and plants. Wöhler found in that year that ammonic cyanate, at about 100° C., becomes converted, by a rearrangement of the atoms of its molecules, into urea. Ammonic cyanate can be made from inorganic materials. If we pass nitrogen over a red-hot mixture of charcoal and potassic carbonate, we obtain potassic cyanide, and a mixture of the latter with plumbic oxide becomes, at a higher temperature, converted into potassic cyanate and lead. Ammonic sulphate added to a solution of an equivalent quantity of potassic cyanate produces, by double decomposition, ammonic cyanate and potassic sulphate. Evaporation of this mixture, at the temperature of boiling water, causes the conversion of ammonic cyanate into urea.

The following equations represent these changes:

$$\underbrace{K_2CO_3}_{\text{Potassic carbonate.}} + C_4 + N_2 = \underbrace{2KCN}_{\text{Potassic cyanide.}} + \underbrace{3CO.}_{\text{Carbonic oxide.}}$$

$$\underbrace{2KCN}_{\text{Potassic cyanide.}} + 2\,PbO = \underbrace{2KCNO}_{\text{Potassic cyanate.}} + 2Pb.$$

$$\underbrace{2KCNO}_{\text{Potassic cyanate.}} + \underbrace{(NH_4)_2SO_4}_{\text{Ammonic sulphate.}} = \underbrace{2(NH_4)CNO}_{\text{Ammonic cyanate.}} + \underbrace{K_2SO_4.}_{\text{Potassic sulphate.}}$$

$$\underbrace{2NH_4CNO}_{\text{Ammonic cyanate.}} = \underbrace{2N_2\begin{cases}CO\\H_4\end{cases}}_{\text{Urea.}}.$$

This discovery rendered the opinion that organic bodies could only be formed by the intervention of the vital force untenable.

Organic chemistry was not, however, advanced enough at that time to induce other investigators to work in the same direction. Not only were the methods of investigation not sufficiently developed, but also the whole course of chemical thought happened to be in a different groove. Accordingly, for a long time after, the artificial formation of organic substances made but slow progress.

Another example of a similar kind is the synthesis of acetic acid (1845). Dry chlorine and carbonic disulphide produce chloride of sulphur and carbonic perchloride—

$$\underbrace{CS_2}_{\text{Carb. disulphide.}} + 4Cl_2 = \underbrace{CCl_4}_{\text{Carb. perchloride.}} + 2Cl_2S.$$

Carbonic perchloride decomposes at a red heat into chlorine and carbonic chloride—

$$2CCl_4 = \underbrace{C_2Cl_4}_{\text{Carb. chloride.}} + 2Cl_2.$$

Now, carbonic chloride, according to Kölbe, produces, in contact with chlorine and water, trichloracetic acid,

$$C_2Cl_4 + Cl_2 + 2H_2O = 3HCl + \underbrace{C_2Cl_3HO_2}_{\text{Trichloracetic acid.}},$$

and trichloracetic acid with nascent hydrogen, hydrochloric and acetic acids—

$$\underbrace{C_2Cl_3HO_2}_{\text{Trichloracetic acid.}} + 3H_2 = \underbrace{C_2H_4O_2}_{\text{Acetic acid.}} + 3HCl.$$

Thus, it is seen that sulphur, chlorine, hydrogen, water, and carbon, are the materials from which a substance can be formed, which formerly could only be procured by a sort of fermentation, or the dry distillation of wood.

A few years later, 1849, Strecker made lactic acid from prussic acid, acetic aldehyde, and water. The reactions by which this synthesis was effected being as follows:

$$\underbrace{C_2H_4O}_{\substack{\text{Acetic}\\\text{aldehyde.}}} + \underbrace{CNH}_{\substack{\text{Prussic}\\\text{acid.}}} + 2H_2O = \underbrace{C_3H_6O_3}_{\text{Lactic acid.}} + \underbrace{NH_3}_{\text{Ammonia.}}$$

It would be very easy to add many more examples of a similar character.

By far the greater number of organic bodies consist of carbon, hydrogen, and oxygen, or carbon, hydrogen, oxygen, and nitrogen. These four elements can, by combining in different proportions, produce thousands, perhaps millions, of distinct and well-characterised substances.

If we consider other elements we find that they unite only in comparatively few proportions, and give rise to a very limited number of compounds. For example, sulphur and hydrogen form only two, whereas carbon and hydrogen are known to produce more than a hundred well-defined combinations. Phos-

phorus, hydrogen, and oxygen, form only a few, carbon, hydrogen, and oxygen, thousands of compounds. The result of such comparisons is, that the carbon compounds by far exceed in number the compounds of all the other elements added together. But then the question arises, Why are the carbon compounds so numerous?

The atoms of carbon have a far greater tendency to combine with each other than the atoms of other elements, and if once united carbon atoms are not so easily separated from each other as the combinations of atoms of other elementary substances. In peroxide of hydrogen we have two atoms of oxygen united, and to these two atoms of oxygen two hydrogen atoms are attached. Acetylene possesses a similar constitution; to two combined carbon atoms two hydrogen atoms are united. Now, the two oxygen atoms in peroxide of hydrogen separate from each other with the greatest facility, whilst the two carbon atoms in acetylene are attached to each other by a force of such intensity that they are able to pass through very violent chemical reactions without undergoing separation. Not only two atoms of carbon, but any number up to fifty and more, can combine together and form nuclei, to which the atoms of other elements can attach themselves, and thus the existence of thousands of carbon compounds becomes intelligible. These two qualities, then—the power of the atoms of combining with each other and the strong affinity with which they keep together if once united—distinguish carbon from all other elements.

Four atoms of carbon, ten of hydrogen, and one of oxygen, form one molecule of ethylic ether, and the same constituents, in the same proportions, are also found in one molecule of butylic alcohol. The two bodies are said to be isomeric, and are represented by the formula $C_4H_{10}O$. Both show great differences in their physical and chemical properties. How can these differences coexist with identity of qualitative and quantitative composition?

The atoms of different elements do not possess the same equivalent or replacing value. Chlorine acting under various conditions on acetic acid can replace in the latter one, two, or three atoms of hydrogen by the same number of its own atoms, forming mono-, di-, or trichloracetic acid respectively—

$C_2H_4O_2$ . . . acetic acid.

$C_2\left\{\begin{matrix} H_3 \\ Cl \end{matrix}\right\}O_2$ . . . monochloracetic acid.

$C_2\left\{\begin{matrix} H_2 \\ Cl_2 \end{matrix}\right\}O_2$ . . . dichloracetic acid.

$C_2\left\{\begin{matrix} H \\ Cl_3 \end{matrix}\right\}O_2$ . . . trichloracetic acid.

An atom of chlorine also produces, with an atom of hydrogen, one molecule of hydrochloric acid; an atom of chlorine is, therefore, equivalent to an atom of hydrogen.

If common alcohol be oxidized to acetic acid, two atoms of hydrogen of alcohol are replaced by an atom of oxygen.

C_2H_6O . . . . alcohol.

$C_2\left\{\begin{matrix} H_4 \\ O \end{matrix}\right\}O$ . . . . acetic acid.

Two atoms of hydrogen combine chemically with one atom of oxygen to form one molecule of water; accordingly, one atom of oxygen is equivalent to two atoms of hydrogen. Similar considerations show that one atom of nitrogen is, in many compounds, equivalent to three, and one atom of carbon equivalent to four atoms of hydrogen. Ammonia is represented by the formula NH_3, and marsh-gas by CH_4. If we replace, in water, the oxygen by its equivalent of chlorine, we require, according to the above statements, two atoms of chlorine—

$\left.\begin{matrix} H \\ H \end{matrix}\right\}O$ . . . water.

$\left.\begin{matrix} H \\ H \end{matrix}\right\}\begin{matrix} Cl \\ Cl \end{matrix}$ . . . hydrochloric acid.

But we obtain from one molecule of water two molecules of hydrochloric acid, each containing one atom of hydrogen. In fact, by replacing the oxygen of water by chlorine we obtain from each molecule of water two molecules of the acid. The two hydrogen atoms in water were held together by the atom of oxygen. They are not united with each other, but form part of the same molecule of water, because each, independent of the other, is joined to the same atom of oxygen. This is called indirect combination. Similar considerations apply to ammonia and marsh-gas. The three atoms of hydrogen in one molecule of the former are severally joined to one

atom of nitrogen, and four atoms of hydrogen of the latter in the same manner to an atom of carbon. If the carbon in marsh-gas is replaced by its equivalent of chlorine from one molecule of marsh-gas, four of hydrochloric acid, and if so replaced by oxygen two molecules of water are obtained.

$$\left.\begin{array}{c}H\\H\\H\\H\end{array}\right\}C \qquad \left.\begin{array}{c}H\\\hline H\\\hline H\\\hline H\end{array}\right\}\begin{array}{c}Cl\\\hline Cl\\\hline Cl\\\hline Cl\end{array} \qquad \left.\begin{array}{c}H\\H\\\hline H\\H\end{array}\right\}\begin{array}{c}O\\\hline O\end{array}$$

Marsh-gas. Hydrochloric acid. Water.

Reasoning of this nature shows that the carbon atoms can be combined in two ways in a body of the formula $C_4H_{10}O$. Either the four carbon atoms are united, so as to form one nucleus, to which the hydrogen and oxygen atoms attach themselves, or the carbon atoms form two nuclei, consisting of three and one or two and two atoms respectively, and combined to one molecule by the interposition of the oxygen atom. Experiment shows that the former is the case in butylic alcohol and the latter in ethylic ether.

$$\left.\begin{array}{c}C_4H_9\\H\end{array}\right\}O \qquad\qquad \left.\begin{array}{c}C_2H_5\\C_2H_5\end{array}\right\}O$$

Butylic alcohol. Ethylic ether.

In ether, to each carbon nucleus five hydrogen atoms are attached, thus forming two equivalents of the radical ethyl, and these, by their union with an atom of oxygen, constitute one molecule of ether. To the carbon nucleus of butylic alcohol nine hydrogen atoms are joined, thus representing one equivalent of butyl, and the latter and one atom of hydrogen and an atom of oxygen form butylic alcohol. Ether and butylic alcohol, therefore, resemble water in their structure. If one of the hydrogen atoms of water be replaced by butyl we have butylic alcohol, if both hydrogen atoms be replaced by ethyl we have ethylic ether. Hence these substances are said to be formed on the water type.

Ethyl in ether and butyl in butylic alcohol are called compound radicals because they can comport themselves like elements in chemical combinations; but a compound radical can

besides hydrogen contain also oxygen, or the atoms of other elements.

If alcohol be heated with sulphuric acid, besides other products ether is obtained. Placing the formula of the two bodies side by side—

$$\underset{\text{Alcohol.}}{\left.\begin{matrix} C_2H_5 \\ H \end{matrix}\right\} O} \qquad\qquad \underset{\text{Ether.}}{\left.\begin{matrix} C_2H_5 \\ C_2H_5 \end{matrix}\right\} O}$$

we perceive that there are twice as many carbon atoms in one molecule of ether as in one molecule of alcohol. But if we wish to produce a body of the same quantitative composition as ether, viz. butylic alcohol, from common alcohol, the problem becomes very complicated and difficult; the difference between the two cases being that in ether we have still the same radicals as in ethylic alcohol, whereas, for the formation of butylic alcohol, a new radical not present in ethylic alcohol is required. To produce this the carbon atoms of two equivalents of ethyl must be united into one nucleus. Here we have the difficulty which chemistry has to overcome when the building up of organic molecules of complex constitution has to be performed from inorganic substances, or from organic bodies of comparatively simple structure.

Within the last twenty-five years we have come by degrees into possession of several general methods, which allow us in a systematic manner to combine carbon with carbon, viz. to produce from radicals containing only one atom of carbon new ones with many atoms of this element.

Thus, it is now possible to prepare butylic alcohol from ethylic alcohol.

The union of two or more radicals to one, with all the carbon atoms united, does not, as a rule, take place by a simple combination of two or more organic molecules. Two molecules of marsh-gas, or two molecules of benzole, do not combine with each other in a chemical sense. Acetic acid and ethylic alcohol act on each other, and, by what is called double decomposition, produce water and acetic ether.

$$\underbrace{\left.\begin{matrix} C_2H_3O \\ H \end{matrix}\right\} O}_{\text{Acetic acid.}} + \underbrace{\left.\begin{matrix} C_2H_5 \\ H \end{matrix}\right\} O}_{\text{Ethylic alcohol.}} = \underbrace{\left.\begin{matrix} C_2H_3O \\ C_2H_5 \end{matrix}\right\} O}_{\text{Acetic ether.}} + \left.\begin{matrix} H \\ H \end{matrix}\right\} O$$

But acetic ether contains still only the radicals of alcohol and

acetic acid, indirectly combined by the agency of an atom of oxygen. But if we take two molecules of marsh-gas, and remove from each molecule an atom of hydrogen, the two molecular residues will enter into chemical union, and produce a new carbon compound, in which the carbon atoms of the two original marsh-gas molecules are in direct union.

$$\underbrace{CH_4}_{\text{Marsh-gas,}} - H = CH_3$$

and

$$CH_3 + CH_3 = C_2H_6. \quad \text{Ethylic hydride or methyl.}$$

From ethylic hydride, ethylic alcohol and other compounds containing two atoms of carbon in their molecules can be easily obtained.

The composition and constitution of oxalic acid is expressed by the formula—

$$\left.\begin{matrix} C_2O_2 \\ H_2 \end{matrix}\right\} O_2$$

The oxygen atoms are contained in two ways in this molecule. Two of them are entirely combined with carbon, whereas the other two are partly combined with carbon and partly with hydrogen. Let us now replace one of the oxygen atoms which are only combined with carbon by its equivalent of hydrogen, and the result will be glycollic acid, an acid which can also be made from glycocoll or acetic acid.

$$\underbrace{\left.\begin{matrix} C_2O_2 \\ H_2 \end{matrix}\right\} O_2}_{\text{Oxalic acid.}} \qquad \underbrace{\left.\begin{matrix} C_2OH_2 \\ H_2 \end{matrix}\right\} O_2}_{\text{Glycollic acid.}}$$

We will now imagine that the atom of oxygen has been abstracted from oxalic acid, and that the two atoms of hydrogen do not take the place of this atom of oxygen simultaneously, but that they enter the molecule one after the other. Then there will be a moment when only one of the two hydrogen atoms has got into the position of the oxygen, and at this moment the molecule would be represented by the following formula:

$$\left.\begin{matrix} C_2OH \\ H_2 \end{matrix}\right\} O_2$$

and we perceive that the radical C_2OH wants for its completion one atom of hydrogen. Now, experience shows that two such

incomplete radicals can combine and form a new radical, which, in this case, would contain four atoms of carbon.

$$\left.\begin{matrix} C_2OH \\ H_2 \end{matrix}\right\} O_2 \quad + \quad \left.\begin{matrix} C_2OH \\ H_2 \end{matrix}\right\} O_2 \quad = \quad \left.\begin{matrix} C_4O_2H_2 \\ H_4 \end{matrix}\right\} O_4$$
$$= C_4H_6O_6 = \text{Tartaric acid.}$$

The conversion of oxalic acid into glycollic and tartaric acids has lately been accomplished in the laboratory of the hospital.

For this purpose, instead of oxalic acid the ether of this substance was employed. If we adopt for ethyl the symbol Et the formula of oxalic ether would be—

$$\left.\begin{matrix} C_2O_2 \\ Et_2 \end{matrix}\right\} O_2$$

This ether was dissolved in alcohol, and the solution treated with sodium-amalgam. The sodium dissolves in the alcohol, and evolves at the same time hydrogen, just as it would do if put upon water.

$$Na_2 \quad + \quad 2\left.\begin{matrix} H \\ H \end{matrix}\right\} O \quad = \quad H_2 \quad + \quad \underbrace{2\left.\begin{matrix} Na \\ H \end{matrix}\right\} O}_{\text{Sodic hydrate.}}$$

$$Na_2 \quad + \quad 2\left.\begin{matrix} C_2H_5 \\ H \end{matrix}\right\} O \quad = \quad H_2 \quad + \quad \underbrace{2\left.\begin{matrix} Na \\ C_2H_5 \end{matrix}\right\} O}_{\text{Sodic ethylate.}}$$

Hydrogen thus developed acts on oxalic ether In the first place it takes out an atom of oxygen, forming therewith water.

$$\left.\begin{matrix} C_2O_2 \\ Et_2 \end{matrix}\right\} O_2 \quad + \quad H_2 \quad = \quad \left.\begin{matrix} C_2O \\ Et_2 \end{matrix}\right\} O_2 \quad + \quad H_2O$$

If now only one atom of hydrogen enters into the position of the abstracted oxygen, two molecules will combine and form tartaric ether.

$$\left.\begin{matrix} C_2O \\ Et_2 \end{matrix}\right\} O_2 \quad + \quad H \quad = \quad \left.\begin{matrix} C_2OH \\ Et_2 \end{matrix}\right\} O_2$$

and

$$\left.\begin{matrix} C_2OH \\ Et_2 \end{matrix}\right\} O_2 \quad + \quad \left.\begin{matrix} C_2OH \\ Et_2 \end{matrix}\right\} O_2 \quad = \quad \underbrace{\left.\begin{matrix} C_4O_2H_2 \\ Et_4 \end{matrix}\right\} O_4}_{\text{Tartaric ether.}}$$

But tartaric ether in contact with water decomposes into alcohol and tartaric acid.

$$\left.\begin{matrix}C_4O_2H_2\\Et_4\end{matrix}\right\}O_4 + 4\left.\begin{matrix}H\\H\end{matrix}\right\}O = \left.\begin{matrix}C_4O_2H_2\\H_4\end{matrix}\right\}O_4 + \underbrace{4\left.\begin{matrix}Et\\H\end{matrix}\right\}O}_{\text{Alcohol.}}$$

If, however, two atoms of hydrogen (the whole quantity equivalent to an atom of oxygen) take the place of the atom of oxygen, glycollic ether is produced, and as the molecules of glycollic ether are complete two of them do not unite, as happened in the formation of tartaric ether.

$$\left.\begin{matrix}C_2O\\Et_2\end{matrix}\right\}O_2 + H_2 = \left.\begin{matrix}C_2OH_2\\Et_2\end{matrix}\right\}O_2$$

Glycollic ether, like tartaric ether, under suitable conditions, decomposes with water into glycollic acid and alcohol.

$$\left.\begin{matrix}C_2OH_2\\Et_2\end{matrix}\right\}O_2 + 2\left.\begin{matrix}H\\H\end{matrix}\right\}O = \underbrace{\left.\begin{matrix}C_2OH_2\\H_2\end{matrix}\right\}O_2}_{\text{Glycollic acid.}} + \underbrace{2\left.\begin{matrix}Et\\H\end{matrix}\right\}O}_{\text{Alcohol.}}$$

In this way, then, by the treatment of oxalic ether with sodium-amalgam, products were obtained, from which easily glycollic and tartaric acids could be separated.

Carbonic oxide and potassic hydrate combine to potassic formate.

$$CO + \left.\begin{matrix}K\\H\end{matrix}\right\}O = \underbrace{\left.\begin{matrix}K\\COH\end{matrix}\right\}O}_{\text{Potassic formate.}}$$

Potassic formate heated with alkalies yields potassic oxalate and hydrogen.

$$2\left.\begin{matrix}K\\COH\end{matrix}\right\}O = \underbrace{\left.\begin{matrix}C_2O_2\\K_2\end{matrix}\right\}O_2}_{\text{Potassic oxalate.}} + H_2$$

And from potassic oxalate and ethylic alcohol oxalic ether can be prepared.

Thus we see that by easy steps we can build up, by means of carbon, oxygen, potassic hydrate, &c. &c., vegetable acids, like tartaric acid. If we now remember that along with salts of tartaric acid those of glycollic acid also have been found in grapes, then we arrive at the conclusion that the chemical changes, by which nature produces from carbonic acid vegetable acids of complex structure, must bear a great resemblance to those employed for the same purpose in the laboratory.

ON

FOLLICULAR DISEASE OF THE SCALP.

By JAMES F. GOODHART, M.B.

The subject of follicular disease has already received attention in a former volume of the 'Guy's Hospital Reports,' at the hands of Mr. Cock and Mr. Birkett;[1] and more recently Mr. Prescott Hewett, in an article on "Sebaceous Tumours of the Cranial Region,"[2] has again given some details as to its nature. On its clinical aspect, perhaps, nothing more need be said, and on that head I shall do little more than remark that a disease which puts on so many of the features of epithelial cancer, and yet if removed is of an innocent nature, needs nothing further to recommend it to the careful study of the pathologist. Its minute anatomy, however, and etiological relations are still but deficiently known from the want of more numerous detailed cases, and I have, therefore, thought it worth while to put on record, in the present short communication, the microscopical appearances of two such growths which have lately come under my notice. I am the more anxious to do this since one of the cases, apart from the interest which would attach to it as affording material for addition to our knowledge of the general characters of sebaceous tumours, has one or two features of special interest, which will repay a few minutes' consideration.

This specimen, which will be described as Case 1, is to be found in the museum of the Royal College of Surgeons, and was

[1] 'Guy's Hosp. Reports,' series ii, vol. 8.

[2] 'St. George's Hosp. Reports,' 1869, p. 91.

presented by Mr. Poland in 1870. The second case was also primarily under that gentleman's care, and latterly under that of my friend Mr. Davies-Colley, to whose kindness I am indebted for permission to make use of the latter part of the case.

The report of Case 1 runs thus:

Tumour on the Scalp ? sebaceous.—Edward W—, æt. 56, a publican, was admitted under Mr. Poland, January 12th, 1870. His mother had a small sebaceous tumour on her head, which burst, and soon afterwards healed up. No history of tumour of any kind except this in the family.

Twenty-five years ago a little lump appeared on the back part of the top of the head, on the right side. Until a year ago this was only the size of a walnut; since then it has been increasing, accompanied by shooting pains, which come on at intervals.

On admission.—He has a large tumour, the size of a man's closed fist, on the top of the right side of the head. It has two encrusted lumps upon it, and resembles a large sebaceous tumour. There is no enlargement of the cervical glands. Subsequently, during a fit of coughing, the tumour ruptured, and bled a good deal. He passes a good deal of albumen in his urine.

After its removal, which was accomplished by the electric cautery écraseur, the tumour did not present the appearance of an ordinary sebaceous tumour. It had no soft cheesy contents, and to the unaided eye the section looked like a compound gland, and in one or two places blood was effused into its substance. A fresh section, under a quarter of an inch, showed squamous epithelial cells, as well as elongated and branching ones; some very fine fibres were also seen.

Not to give a detailed report of the patient further, he went on well but for an attack of erysipelas, after which some pieces of bone were removed from the cranium, and he left the hospital with the wound healing on August 15th, 1870.

The tumour first attracted my attention on the shelves of the Hunterian Museum by the glandular appearance of the section, as described in the report above. The following is a more minute description of its general and microscopical appearances:

The growth is enclosed in a fibrous-looking capsule, which sends off prolongations into the substance of the tumour. These,

ramifying throughout it, cut it up into many roundish lobules of varying size, and give it many of the rough general characteristics of a glandular growth. Its section is cystic throughout, none of the cysts being of larger size than half to one line in diameter. Some of these are filled with soft and irregular-shaped granulated deposits; none contain any lobulated intracystic growths.

Examined microscopically, the tumour may be said to be purely epithelial; in one or two places, indeed, small local patches of round nuclei are to be seen in a faintly fibrillated stroma, but such are but few in number.

Taking, now, a single small lobule, with its enclosing capsule or fibrous septum, for more minute description, it may be said that under a $\frac{1}{5}$th inch objective the fibre-like substance was nowhere of a fibrous character, but only consisted of homogeneous hyaline bands of substance, which, generally fatty and granular, seemed to have no definite structure.

In places the appearances rather indicated that the substance was formed by a compressed or fused epithelium, but of this I could not be certain. The point, however, to which I would draw attention is that many of the septa were not of the usual organised type, though vessels were freely distributed in them. The cells contained within each interlobular septum were epithelial, with a most regular arrangement of the cells, now extending uninterruptedly over a considerable area, now divided up into band-like processes by the occurrence of cavities in its substance. The cells themselves were beautifully regular in apposition, form, and nucleus (figs. 2 and 3); but everywhere many could be seen to be becoming greasy in their appearance, and agglomerated together for the purposes of disintegration. In this way it was evident that the cysts in the tumour had formed by a mere softening process of the central parts of tracts of epithelium, in contradistinction to the more usual form of proliferous cyst in the breast, ovary, &c., where the multiplication of cavities is brought ahout by the approximation and folding together of numerous papillated growths. The lining of each cyst, in most cases, assumed an obscurely fibrous aspect (figs. 2 and 3), while the contents of the cysts were no more than degenerated epithelium.

The skin at the base of the growth was much obscured in its

structure by fatty material, but when cleared up by ether the corium was found extensively invaded by an epithelial growth (fig. 1), arranged much after the manner of gland acini. It is, I think, not improbable, from a somewhat similar appearance in Case 2, that this was due to the disease attacking, for the most part, the epithelial lining of the hair-follicle. Where the epithelium had fallen out in making the sections a delicate reticulum of connective tissue was left behind, closely resembling the stroma of many of the sarcomata.

Now, in this case, the malignant nature of the growth may be fairly questioned, and if the interpretation put upon the appearance as depicted in fig. 1 be correct, then I think it may be said that no evidence existed of any tendency to recur, seeing that the tissues nearest to the growth showed no signs of participation in the disease. It is, however, open to doubt whether the locular arrangement of epithelium in the corium was not an invasion of its tissue by new growth, in fact, an epithelioma, rather than a mere hypertrophy of the follicular lining.

The history of the second case is shortly this, which I abstract from the report of the surgical ward clerk, Mr. Farrant Fry:

Anne C—, æt. 60, a married but sterile woman, without history of any similar disease in any of her family, noticed, twenty years ago, a small lump like a wart on the right side of her head, but which did not increase much till five years ago. She was then told by a medical man she had a fatty tumour between the layers of the skin. Soon after, while combing her hair, she punctured the tumour, which was now about the size of a penny, and projecting from the surface; a quantity of matter came away, and it quite healed in a few days.

Three years after the tumour came again, and has gradually increased ever since. She was told by medical men she had a cancer. She has wasted lately. I insert these details to show the changes that the tumour underwent; at first it is described as a fatty tumour between the layers of the skin, which features might very well be put on by a sebaceous cyst. Latterly it is described as a cancer.

When admitted she had an irregularly globular, somewhat flattened mass, on the anterior part of the right parietal emi-

nence, two and a quarter inches in diameter, and raised an inch from the surface. It is nodular, growing from a comparatively small base, and overlapping it, giving to the edges a somewhat everted appearance. The surface is, at parts, reddish and bleeding, at others covered with flakes, and discharging; no appreciable enlargement of the cervical glands; but there is slight nodular enlargement over the mastoid process, which the patient says was there before the tumour came.

It was considered by Mr. Poland to have been primarily a sebaceous cyst, which, after disintegration, had subsequently become a fungating tumour. In this opinion his surgical colleagues concurred.

The growth was removed, on August 2nd of the present year, by the electric cautery; and as some portions were left behind, the surface was well seared afterwards.

August 22nd.—It is noted that the growth has partially returned, growing out in the same way as before.

30th.—Two fresh masses had formed, one $1\frac{1}{2} \times 1 \times \frac{1}{2}$ inch, the other $\frac{1}{2} \times \frac{1}{2} \times \frac{1}{4}$ inch. Chloroform was given, and portions of scalp and growth were dissected off by Mr. Davies-Colley. She left the hospital seventeen days after this; the wound not yet healed, and with some pieces of bone to all appearance necrosed; a small sebaceous tumour had also made its appearance behind the other.

The microscopical appearances in the second case are by no means dubious, as in Case 1. The tendencies of such a tumour could not be doubted, even if we had not the fact before us that the tumour was a recurrent one. It is chiefly interesting as showing how the appearances met with in distinct types of tumour blend with each other, rendering it difficult to say that this or that growth belongs to any definite group.

The disease removed at the first operation in this case was purely a sarcoma, and very little need be said about it; the cells or nuclei were, perhaps, of rather large size—"large, round-celled sarcoma," and no trace of hair or hair-follicle could be found, even at the margin of the tumour. Fig. 4 is taken from this growth. The parts removed after recurrence are of interest, as illustrating the gradations between the forms of growth. The mass had a locular arrangement, as partially shown in fig. 5, and in some places had a gland-like arrangement, very similar to that shown in fig. 1, only that the cells were now less epi-

thelial than sarcomatous in likeness. In the skin, immediately beyond the growth itself, the structure looked most like an epithelioma, the epithelial lining of the hair-follicles being thickened by new cell-growth, with a less regular arrangement than usual of the cells.

It was hardly possible to say decisively in what part the disease had commenced; but, taking into consideration that the most advanced condition of cell-growth was to be found in some of the hair-follicles, where the tube was literally choked by cells, while the tissues outside were only invaded to a less extent, it seems more probable that, commencing in the hair-follicle itself, the disease had subsequently spread into the adjacent tissues. This would accord, also, with what was observed in the first case. Here, again, though this is not shown in the drawings, it was almost impossible to say, in some sections, whether one was dealing with epithelial cells or with sarcomatous nuclei in their connective reticulum.

A third case is to be found in the 'Transactions of the Pathological Society of London' for 1868. It was exhibited by Mr. Birkett, under whose care it occurred at Guy's, and with his permission I have reinserted it here, as I wish to contrast its microscopical characters with those observed in Mr. Poland's two cases.

A healthy-looking postman, sixty years old, was admitted into Guy's Hospital, in March, 1868, on account of a tumour on his back, which had lately given him inconvenience. The existing growth began as a small lump fourteen years before, and for many years he was almost regardless of its presence.

Attached to the integuments of the back there was a tumour about three inches and a half long, extending nearly parallel with the posterior border of the right scapula, and resting on the fibres of the trapezius muscle. The skin covering its surface was red, and at one extremity curious yellow nodules were to be felt. It was firm and resisted pressure generally, although its outward appearance led to the impression that it was soft. Besides, on the head there were two scalp tumours—one in the left temporal region also showed a hard, yellow body in its substance; a second, on the vertex, was of the ordinary appearance. They had been forming about two years. The dorsal

growth was excised some days before the others. Two or three rather full-sized vessels supplied it with blood; but it was only formed in the integuments, and was perfectly independent of the tissues beneath it.

All the wounds healed rapidly, and the man left the hospital well.

The tumour was referred to the Morbid Growths Committee, and the report was to the effect that the tumour had evidently been situated immediately beneath the skin, a portion of which had been removed with it.

The section was found to consist of two substances—a firm opaque, white, smooth material, collected into masses varying much in size and outline, and connected together by grey semi-translucent fibrous bands.

On microscopical examination, "the projecting part of the tumour is covered by a cutaneous layer of normal structure, the surface of which is papillary, and has been denuded of its epidermis. Beneath the skin is a layer of fibrous tissue arranged in parallel bands."

The mass of the growth consists of a stroma, which is in some parts faintly granular, in others finely fibrillated, and in others, again, represented by bands of parallel fibres. These bands form a reticulum, the meshes of which are occupied by rounded or oval masses, consisting partly of a finely granular and very translucent interstitial substance, partly of aggregations of cells. These aggregations are, in some parts, rounded or oval, whilst in others they occupy sinuous channels of extremely irregular outline, which, from the sharpness of their margins, look as if they had been hollowed out of the stroma. Each of the opaque-white nodules described above, as seen by the naked eye, consists of a similar arrangement of fibrous and cellular structures, enclosed in a distinct capsule of white fibrous tissue.

"The cells are rounded, oval, or polygonal, contain, for the most part, a simple nucleus, and measure from $\frac{1}{2000}$ to $\frac{1}{2500}$ inch in diameter. In general appearance and character they closely resemble glandular epithelial cells; but in no respect have they any arrangement similar to that seen in normal or pathological gland-formations. Many of the masses of clear interstitial substance are cylindrical, and in these the axes appear to be occupied by refractive granules, the nature of

which could not be determined, although their appearance is very characteristic."

The committee then proceeds to say that the tumour presented such marked peculiarities of structure as to render it difficult to establish its precise position in any classification. It would appear to belong to the class of tumours designated by Virchow as the "fibromas of the skin and subcutaneous tissue," in which are included elephantiasis, molluscum, and papilloma.

A drawing of the gland-like cells with their arrangement, in regard to the fibrous parts of the tumour, is also appended, and published in the volume of 'Transactions' for the year 1868.

A fourth case is that known as Chassaignac's, and was described by that surgeon as one of Cancroide du Crâne. It occurred in an old woman of sixty-eight, who had noticed two small tumours on the scalp at twenty years of age. Sebaceous matter exuded from these when she had attained the age of forty years; but not till sixty did they begin to grow, when, after a blow, bleeding and rapid increase took place. Subsequently smaller tumours came on other parts of the scalp, and she died by ulceration attacking the bone and exposing the brain. No trace of disease existed in any of the neighbouring glands.

The microscopical details of the case have been fully described by M. Rouget, but I have been unable to lay my hands on the paper; Mr. Prescott Hewett, however, giving particulars of the case, states that M. Rouget characterises the growth as "une tumeur épithéliale presentant une structure toute spéciale," so that we may infer that this case also was very closely allied to those which have now been narrated.

From the foregoing descriptions it will, I think, be evident that the first three tumours, at any rate, described in this paper were, all of them, growths similar to those described by Mr. Cock, in his communication already alluded to; and believing that they were so, I have not hesitated to apply the term "follicular disease" to the two cases with which I am more especially here concerned. But though similar in their rough general characteristics, both to each other and to the group described by Mr. Cock, it will be equally patent that the microscopical peculiarities of each were somewhat different—one

resembling a gland in its cellular elements more nearly than anything else, a second being of an epithelial character; the third sarcomatous.

It next became a question whether, proceeding upon their microscopical differences, each should be described as a distinct species, or whether they ought not to be regarded as varieties having a common origin, or as different results of a single cause. I have elected to take the latter view, and this not because, in the examination of the cases before us, any decisive indications were observed, one way or the other, for such were not present, but rather upon the more general ground that in this, if not in all tumours, varying *ad infinitum* as they do, analogy forms the most reliable guide to classification.

In accordance with this opinion I shall, therefore, proceed at once to obtain some evidence as to the nature of follicular disease from indirect evidences, of which not the least important is the fact that most of such tumours are associated with more or less numerous sebaceous or atheromatous cysts, either in their own neighbourhood or situated on other parts of the body. It will next be remembered that, given a cavity or space in any part of the body under abnormal conditions, there is a tendency for that space to become obliterated by the growth of cells into it from the surrounding wall; hence the filling up of an abscess cavity by granulation tissue, the stuffing of cysts in the breast or ovary with intra-cystic growths, while in the matter of follicular tumours there seems enough evidence to indicate that in many cases the tumour may have been wholly produced by transformations or development of its epithelial cells into the fibrillated material, which does duty for fibre and holds the mass together. In all these three cases, but especially so in the more typical specimen (Case 1), such an hypothesis seems probable. All were of a less well-developed structure than is usual in most new growths; the fibroid tissue forming the canaliculi was little more than a delicately fibrillated stroma, and in some places it almost seemed possible to say with certainty that it had been formed by the condensation of epithelial cells.

I say that these tumours are less well developed than most new growths. One need not go far for an explanation of this fact if it be, as I believe, a constant one in their history. A granulation tumour, a fibrous tumour, the sarcomata, &c., are

formed from, and therefore on the plan of, tissue which has passed on from the stage of mere cell aggregation to that of perfect structure—from a mere heap of bricks to a finished edifice. Any fresh superstructure should necessarily be in keeping, and so we find it to be. In the same manner the sebaceous secretion is sebaceous in virtue of the very tendency of its cell constituents to pass rapidly into a fatty state, and it would be remarkable if, no matter what its further evolution, this tendency could not in some measure, more or less, still be traced. Accordingly we find, first, that they easily degenerate, and this in a way quite different from the minutely granular fat change which may usually be observed in other degenerating new growths. They become oily and glistening in a manner which is difficult to describe, but which, when once seen, is very characteristic. Secondly, follicular tumours are very frequently associated with cysts, formed, not by any active growth, as in other tumours, but rather as a part of or pertaining to the degeneration which has just now been described; the central parts of tracts of cells become soft and sebaceous, while the circumferential parts more advantageously situated for maintaining their nutrition still continue to exist. Here we have a fact which seems, whatever explanation may be given of its occurrence, to throw some light upon a disputed point in the pathology of sebaceous cysts. It has long been held by some that wens are no more than retention cysts. It is thought by others that they are new formations. Now, if in what is evidently a new growth there still remains a trace of its origin from cells which, in a normal condition, should have formed sebaceous matter, it may well be that all degrees should occur between complex tumour and simple cyst, according as the tumour tendency is energetic or the obstacles to the existence of what is, at best, a lowly organised structure are predominant. Exactly, then, as an encephaloid mass in the liver or elsewhere is found with a wall of tumour and cream-like contents, so is the sebaceous mass with its contained pultaceous matter.

In illustration of this point, that an apparent cyst may be in reality a growth, a case may be mentioned, which I had an opportunity of examining a short time ago by the kindness of my friend Mr. Richard Rendle. An infant had some small molluscous tumours on its face, and what was, to all appear-

ance, a sebaceous cyst over the right eye, at the outer extremity of the brow. It may also be stated that the mother had a well-marked specimen of molluscum contagiosum in the right temporal region. The sebaceous cyst was carefully dissected out, and then hardened in chromic acid. When cut in half its wall was noticed to be rather thick, and on making a section of this wall it at once became evident, by the usual appearances, that what had been a tumour was now a cyst, with all the microscopical characteristics of molluscum contagiosum still remaining.

The other view, and the more mechanical one, as to the production of wens may be stated thus:—that within a follicle some accidental accumulation of the secretion occurs, which gradually fills the follicle, when, by the pressure of the material so retained, the outer layers become fused together and semi-organised, much as a fibrin clot in the cavity of the heart, or of an aneurismal pouch, becomes fused into a fibroid tissue, which, blending with the atrophied muscle or arterial coats, is with difficulty distinguishable from them. This condition is described by Mr. Prescott Hewett as common in sebaceous tumours, when he says,[1] "In many cases it is difficult to define the exact boundaries of the cyst itself, so intimately blended are the cyst and some of its contents."

But whether this or that theory be accepted as to their probable origin, it must be apparent how very close is the connection between sebaceous cysts and follicular tumours, and therefore between secretion and morbid growth. Possibly, as I have endeavoured to show somewhat more fully elsewhere,[2] the two latter processes are, to a certain extent, correlated, but as to direct evidence on the point, in this special instance, there is none, since it could not be ascertained whether the primary growth was from the lining membrane of the cyst, though I saw enough to make me think that very likely it was so.

The former view, however, of the two has another very strong ground for its support in the fact, as stated by Sir J. Paget, that "wens are more frequently hereditary than any form of cancer." Now, it is hard to conceive that a mere retention of secretion can be hereditary or anything, indeed, more than mere accident, while it is very easy of conception, nay,

[1] Loc. cit. [2] 'Edinburgh Medical Journal,' May, 1872.

very probable, that a tendency to abnormal cell growth may be engrafted on the ovum from the parent. That sebaceous cysts or tumours occurring in connection with the skin are entirely new formations, in the sense that they have no connection at any period of their development with the sebaceous glands or hair follicles, I see no evidence.

One other point of some interest may also be touched upon here, inasmuch as it has a rather wide bearing on many pathological processes. I refer to the view that has been generally held that the horny layer of the epidermis, sebaceous matter, &c., is so far an excretion as to be entirely dead to the body which produced it, and to be no longer a part of that body, but an extraneous substance. These follicular tumours seem rather to point to an opposite conclusion, and tend to show that cells whose proper function is to form sebaceous matter are by no means incapable of further life when shed, but that, under favorable conditions, the most obvious of which is that they shall be retained within the parent follicle or cyst, they may imbibe nutriment sufficient to maintain a low state of existence till, by the projection of vessels into the mass, that existence shall become to a certain extent secured.

The same principle is accepted without hesitation in the case of skin grafting, and it seems perfectly sufficient to explain the contagious principle of molluscum contagiosum or, even still further, the *possible* contagious element in a cell of any tumour. Such a thing, at any rate, is not impossible.

And now for a word on the more general relations of follicular tumours. They have been described by Mr. Cock, in the paper before alluded to, as growths which are of an innocent nature, that is to say, which are non-infiltrating, non-recurrent, and without any of the anatomical characteristics of cancer. In taking this question into consideration, however, I would wish to bring prominently into notice one feature of such cases which is surely very significant, and which, it may be, has been rather overlooked. I refer to the time of life at which the disease occurs. Of the various cases which are recorded of follicular disease, Mr. Cock gives the ages of five patients; they were 65, 40, 45, 72, and 53 years of age respectively. Sir James Paget gives a note of a case in his 'Surgical Pathology' at 80 years. Delpech describes such a disease

(quoted by Prescott Hewett) in a patient of 62. Chassaignac's patient was 68, while Mr. Birkett's patient and the two under Mr. Poland's care were 60, 56, and 60 years of age. Here we have eleven cases, only two of them being under 50. Further, several cases have now been recorded which, while closely simulating fungating follicular disease, have, when removed, proved to be of a malignant nature. Such cases are described by Sir J. Paget in his 'Pathology,' and by Dr. Cruickshank and Mr. Holmes, in the 'Transactions of the Pathological Society.' These, again, were of the ages of 64, 69, and 64 years.

Now what does this question of age mean? That the cases described as innocent have been incorrectly so called? By no means. But if it means anything at all it surely signifies that one cancerous element, that of senile change, was present, and had produced a tumour, with all its subjective phenomena of growth, apparently without limit as to its power of increase, while the phenomena which characterise malignant growths, in their behaviour with surrounding structures, are absent, as well as those of recurrence after removal.

It is the possession by these tumours of *some* of the attributes of cancers that adds much of interest to a question that can hardly be called important by reason of its frequent occurrence. It will be allowed that, no matter what the special interest attaching to a tumour, it falls short of teaching its most useful lesson if it does not help us on, by its relation to other tumours, to truer views of some branch or other of the physiology of decay. Follicular tumours are not wanting in this respect. Through them, and not only through them, but through all other growths only partial in their characteristics, a view is obtained, it may be said, of cancer in the rough, of the *study* for a picture rather than the picture itself—of an unfinished fabric; and it becomes easier by their aid to supply the finer touches which shall exhibit a growth with malignancy depicted in all its completeness.

It has always been distinctly recognised in practice that cancers are, for the most part, an evidence of senile degeneration. Statistics, such as those of Walshe, Sibley, and Morrant Baker, do but confirm this opinion, and show that the liability to attack increases with the age of the individual. In the

cases before us certain sebaceous tumours, in some instances after a long period of quiescent existence and at the declining period of life, begin to increase in an active manner. It may not be that they put on at once all the characters of infecting tumours, yet, inasmuch as at a critical period they become active in their development, that fact alone should cause them to be regarded with suspicion. The daily practice of surgery does but confirm in other regions this relation between the age of the patient and the character of the tumour. The period of life at which the disease occurs is, it seems to me, the one great point which influences surgeons in the diagnosis between innocent and malignant tumours. Take, for example, those of the female breast. If a patient comes under notice, past middle age, with a nodule which has as yet none of the features of an infiltrating growth, yet a surgeon will be very cautious in pronouncing it of an innocent nature. Or, again, an infiltration of the breast is under consideration, unaccompanied by any glandular enlargement, and perhaps with a definite history of injury. Again, he will lean towards cancer in the old patient, while, without doubt, in younger life the question of chronic inflammation would be discussed and a more hopeful prognosis given.

Thus, it will be seen that sebaceous tumours, with their stage of fungating disease, lead up to the old question of a special cancerous diathesis. Let it not be understood that such a wide subject is about to be argued out here; only proceeding from these special cases it will be well to see what suggestions they offer on the more general question.

Now, if it be true that certain individuals may exist for years with an apparently innocent tumour, and suddenly, at a certain period of life, such tumour may begin to grow and, perhaps, to infiltrate neighbouring structures, it is difficult to explain in such instances the diathesis of later life apart from that of its earlier stages. If ultimately a cancer why not always a cancer, supposing a special tendency to that disease to exist, and yet the earlier stages of these growths could not be designated as such. The proposition, then, which such cases seem to suggest is this, that the tendency to infiltrating and recurrent growths is dependent rather upon the element of age than upon a particular constitutional taint. This is not to say that cancer, using the

term merely as implying certain habits of life on the part of certain tumours is a local disease, but that the hereditary element is a predisposition to abnormal growth in general, and not to special cancer growth.

We are now quite familiar with the fact, ascertained by workers in comparative anatomy, that variations in any direction are liable to be transmitted from parent to offspring, and so to run in direct lines of stock. I see no reason why this law should not be applied to the question under consideration. It was to be expected that this tendency to variation should show itself sometimes in excess as a pathological condition, and so it does. Thus, we meet with cases of exostosis which are regularly transmitted, and the same thing surely may occur with other forms of tumour. But, from the same point of view, it seems highly improbable that cancer, as cancer, should be transmitted; first, because transmission comes most into play in the perpetuation of slight variations or those very closely related to normal conditions. Now cancer, far from being a slight aberration, is a very divergent condition of cell life. Secondly, it is a state which generally appears after sexual life has ceased in great measure. And thirdly, from a purely Darwinian aspect, the diathesis would supply its own corrective, in that, being a condition most unfavorable to those affected by it, the cancerous lines ought to become soon exterminated. It seems on the whole, therefore, that there may be a general tendency to the transmission of variability to the component cells of the body, more particularly in the direction of excess of normal structure. If this condition were constant in any particular organ or tissue, then tumour might, I apprehend, be produced by this tendency to variation, but only if fixed and increased through several generations. But these conditions of variability would not appear to be so sufficiently constant in any one part as to ensure the transmission of tumours, except, perhaps, in exceptional instances. It is, therefore, more probable from this point of view, that local conditions play a large part in determining the excessive growth which tumours represent.

Allowing, then, the transmission of tendency to variation, some families will show this much more conspicuously than others, in that the taint will be stronger in some than in others. These would be the subjects of new growths. The nature of

the tumour *ought*, then, to vary as the time of life, and we may assume that in some persons would appear such excrescences as a crop of warts on the hands or elsewhere, in others, a gland tumour in the breast or a molluscum, or, may be, a cancer or fungating follicular tumour. The progress of the tumour will, I say, be mostly determined by the time of life at which the subject of it has arrived. Cancer being an evidence of senility will be found towards old age, while homologous tumours will appear during the formative stages of existence.

It may be said that a large number of cancerous growths are prone to appear in young life, and by no means necessarily in old people, and this is granted, and indeed is acknowledged as likely. For, in the first place, much as a child may get atheroma of its arteries, or, perhaps, cirrhosis of its liver or kidneys, certain young people may show their early decay by running off into a cancerous state. These, I suspect, are cases of rarity; but there is another explanation of the tumours of young life in the conditions of tumour growth itself:—new growths, or a single cell of the multitudes which compose these compound structures, are acting or growing in obedience to two forces which should act harmoniously together; there is one force acting on the cell itself, by which it lives *per se*. There is another or formative force, by which that cell is moulded to the requirements and the likeness of the parent body. It requires no high flight of imagination to conceive that this balance of force may be destroyed, that the moulding force may be deficient, or (what comes to the same thing, and is, perhaps, more likely in young life), the growing force be in excess, and we have the requisite conditions for the production of a growth which can increase of itself without any attention to surrounding tissue. The condition in advanced life is the same, except that in this case the nutritional force being more nearly constant, the moulding force may be said to be ceasing, if not extinct, and thus again tumour is brought about. Having got thus far, there is another condition which completes the history of the growth and explains its infiltrations, viz. the influence produced on healthy cells by their neighbours in a state of morbid activity. This I shall not enter upon here. The condition is very evident to all observers of tumours, and is very generally recognised. In true hypertrophic tumours the two forces

described may still be supposed to work together, though probably both are somewhat in excess.

This relation between innocent and malignant tumours might, I think, be proved to exist in every tissue in the body; but it is most markedly so in those organs which are the more active, such as the glands. Thus, as has been said, a young woman gets an adenocele in the breast—an older one a scirrhous cancer. The tumours connected with the skin, glands, and follicles are no exception to the rule. They have their growths of young and old life precisely analogous to those of the breast, and in young people we meet with molluscum contagiosum, or a sebaceous cyst; in an old man we meet, sometimes with cancer, and if not with that, then with the disease which I venture to think is an elementary form or early stage of cancer, viz. fungating follicular tumour. It may not, it is true, be a perfect form of cancer; but then the clinical features, viz. infiltration and recurrence, are apparently dependent upon conditions such as duration, and probably to some extent upon local causes.

Summary.—There seems to be enough evidence to show, first, that follicular tumours are, in their bare anatomical details, suspicious in their tendencies, and that, inasmuch as their anatomy is an index, rough though it may be, of their life's process, that is to say, of their pathology, from the latter point of view they may still be said to have very close relations to the cancerous or malignant group.

Secondly. Abundant material is at hand to prove, as former writers on the subject have shown, that, clinically, such tumours have not the behaviour of cancers, and if removed they do not return. Pathology and surgery in its clinical aspect would seem at first sight, then, to come into collision; they do not do so in reality. The non-recurrence of the tumour only shows that the regions more especially prone to attack afford opportunities for their complete extirpation, or that allowing of growth which is malignant in its nature, the local peculiarities of the part have been in some way inimical to the extension of the disease.

It seems almost unnecessary to add that the practice urged by Mr. Cock, in his paper on the subject, as to the advisability of the early removal of the tumour, is very strongly supported by these observations.

DESCRIPTION OF THE PLATE

Illustrating Mr. Goodhart's paper on Follicular Disease of the Scalp.

Fig.

1.—Oblique section of scalp at base of follicular tumour (case 1).

a. Section of hair in its follicle.

b, b. Loculi having somewhat of a glandular arrangement, filled with squamous epithelium.

c, c. The epithelium has here escaped from its bed, leaving a delicate connecting stroma, such as is seen in many sarcomata after pencilling.

d, d. Corium of scalp. 1 inch object. Camera. Chromic acid prep.

2 & 3.—Showing the arrangement of the epithelium round a small cyst.

a, a, Lining membrane of cyst having a fibrous appearance.

b. Squamous epithelium. Fig. 2, 1 inch. Fig. 3, $\frac{1}{8}$ inch object. Camera.

4.—Section of follicular tumour (case 2, 1st operation). From the base of the tumour. Section vertical. It shows the usual appearances of a variety of round-cell sarcoma. All the sections wherever taken had much the same appearance. $\frac{1}{8}$ inch object. Camera.

5.—Section of recurrent follicular tumour, near its junction with the scalp.

a, a. Connective tissue forming loculi.

b. Sarcoma tissue between the loculi.

c, c. Rapidly growing sarcoma, the connective tissue replaced by a rather granular matrix in which the cells lie embedded, a very similar condition to that known as the more common form of myeloid sarcoma. $\frac{1}{8}$ inch object. Camera.

6.—Oblique section of scalp adjacent to the recurrent growth, showing a hair follicle and neighbouring corium structure.

a. Pigmentary fibrous part of hair. The medullary part was absent or not seen.

b. Outer layer of hair which had a very dimly imbricated appearance (root sheath).

c. Epithelial lining of follicle in an early stage of cell proliferation. All stages were seen between this and one in which the hair was represented by a granular brown pigment, and the epithelial cells by closely-packed nuclei.

d, d. Corium with nuclei in its meshes.

e, e. Ducts (of sweat glands?) whose epithelium is undergoing the same growth as the parts around.

Plate. 1.

Fig. 1.

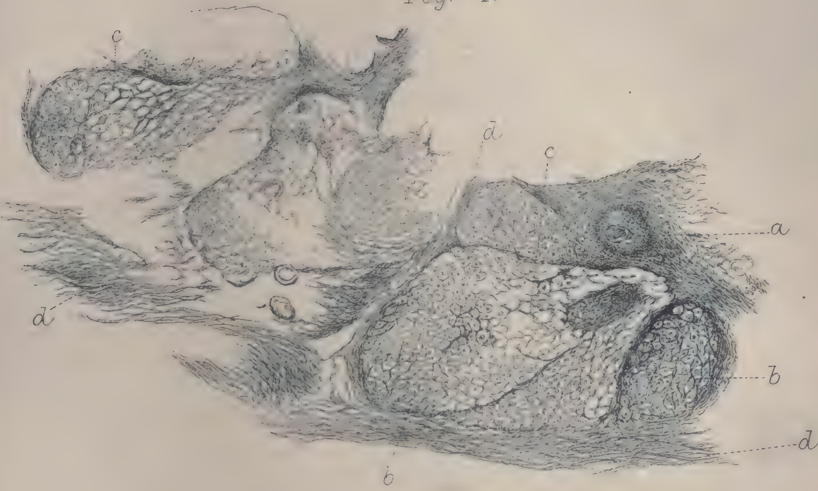


Fig. 2.

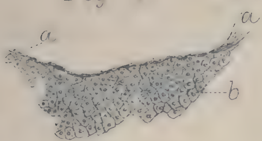


Fig. 4.

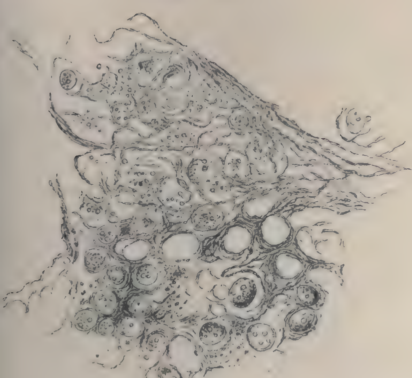


Fig. 3.

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Plate. 2.

Fig. 6.

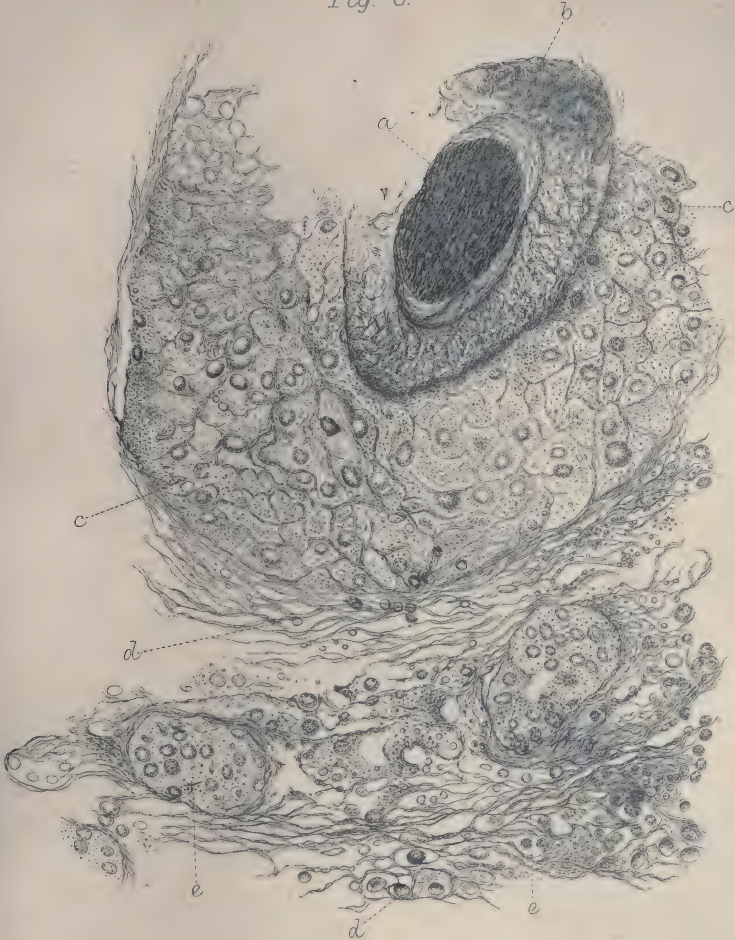
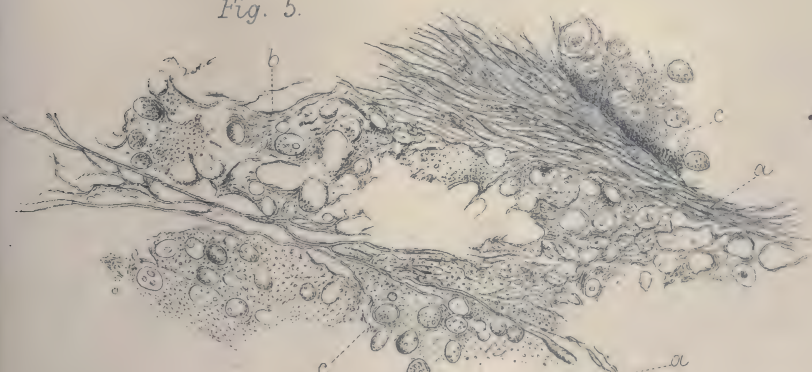


Fig. 5.



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NOTE ON THE

OPERATION OF CIRCUMCISION IN THE ADULT.

By H. G. HOWSE, M.S.

The object of this short paper is to advocate a mode of performing circumcision in the adult, not, I believe, generally adopted.

The usual method given in our text-books is the following. Grasp the foreskin around the glans opposite the corona with a pair of long dressing forceps, and draw it forwards over the glans; then cut off all the skin in front of the forceps with a single sweep of the bistoury. On releasing the forceps, the mucous membrane will be found still encircling the glans; then slit it up, (this is usually done on the dorsal surface), snip through the frænum, trim off the corners of the mucous membrane, and turn it down, uniting the edges by a continuous suture with the skin. As there is often rather a superabundance of mucous membrane, Mr. Cock usually takes out a wedge-shaped piece in place of simply slitting it up, the apex of the wedge being of course placed at the corona.

The practical inconvenience which I have often seen to result in the adult from this, the ordinary method of performing the operation, is, that inflammatory effusion or blood gathers in the loose tissue about the site of the divided frænum, and forms a lump there. In the child this is of comparatively little conse-

quence. The processes of resolution and absorption take place with such rapidity in infancy that very soon nothing remains of any such swelling. But in the adult it is another matter. The cellular tissue about the frænum is looser, and the likelihood of blood extravasation is no doubt increased by the existence of the frænal artery there. The result not unfrequently is, that the symmetry of the organ is marred by a swelling on its ventral portion; and although this is a part of the economy not often exposed to public admiration, yet the presence of such a swelling is an annoyance both to surgeon and patient. In some cases it is not a mere want of symmetry, but a regular knob, which, in five or six cases that I have seen, has attained almost the size of the glans, and has appeared not unlike a bifurcation of this portion of the organ. Indeed, in two cases I have been consulted by married men, who had had circumcision performed three or four years before, and have had, for obvious reasons, to amputate this knob. In all these cases the inflammatory effusion had become converted into perfect connective tissue, and the lump would probably have remained as persistent as the hypertrophied nymphæ, &c., often seen in the inmates of our female syphilitic ward.

The remedy which I propose, and which I have been in the habit of using in all my circumcision cases, is the following:—After removing the skin in the ordinary way, cut out the wedge-shaped piece of mucous membrane *at the frænum* with a pair of scissors, and then snip the frænum cleanly away from the glans, thus removing it and the wedge-shaped bit of mucous membrane in one piece together. Then unite the skin and mucous membrane in the ordinary way, taking care not to let the latter retract too much on to the dorsum, otherwise there will be an insufficient amount on the ventral aspect.

With the operation performed in this way I have never had my self-complacency seriously disturbed by any want of symmetry in the result. In one or two cases where I was not sufficiently careful to avoid retraction of the mucous membrane on to the dorsum in putting in the suture, I have had the formation of a slight dorsal swelling, but this has been very slight, and has completely subsided in the course of a week or two. I attribute this difference to there being so much less loose cellular tissue here than in the region of the frænum. Even this amount,

slight as it is, may be quite avoided by care in putting in the suture.

I am aware that in thus completely taking away the frænum I am not following out the ordinary surgical teaching of the books. Thus, in Holmes' 'System of Surgery' (edit. 1, vol. iv, p. 624), it is prescribed that "the frænum should be left as long as it conveniently can be." The value of this advice does not seem obvious. The frænum may be looked upon as a mere fœtal remnant, having no very definite function. On the other hand, its presence is sometimes decidedly prejudicial. Two or three such cases have fallen under my own observation, where it was absolutely necessary to divide it in the adult, so much inconvenience did it cause from its tight fibrous condition. In these cases it has acted as a band, causing the organ to become curved when distended with blood, behaving, in fact, very much as in the condition of hypospadias, where the corpus spongiosum is congenitally deficient. Mr. Cock tells me that he has seen some scores of such cases, and that so far from leaving it *long*, he divides it to the greatest extent possible. This is a very important thing in our hospital patients, where a ruptured frænum often gives rise to the formation of sores in that region. Hence it is that in such patients we so often see chancres about this portion of the corona.

A DESCRIPTION

OF THE APPEARANCES OF THE

HUMAN EYE IN HEALTH AND DISEASE

AS SEEN BY THE OPHTHALMOSCOPE.

SEVENTH SERIES—MYOPIA; REGION OF THE YELLOW SPOT.

By C. BADER.

Distension and thinning of the coats of the eyeball, especially in the region of the yellow spot and round the optic nerve, accompanied by increased prominence into the orbit of the thinned portions of the coats, thus increasing the distance of the yellow spot from the crystalline lens, is the usual cause of increasing shortsight. The retina being transparent and the sclerotic white, neither coat shows, to the ophthalmoscope, signs of distension, thinning and atrophy, so soon as the choroid does with its pigment and blood-vessels. An acquaintance with the appearance of the choroid in health, its colour, arrangement, course and width of blood-vessels, especially its veins, readily discovers even very slight degrees of atrophy. If the latter occurs in the region of the yellow spot (as it often does), and reaches a high degree, as shown in the plate, then the functions of the retina become implicated. Such patients generally complain of a mist suddenly appearing before the affected eye, of flickering and flashes of light, of objects, cords, &c., appearing distorted; finally, blind spots are observed in the field of vision.

No hope of restoration of "blind parts of the retina" need be entertained.

Fissure in and atrophy of the distended retina, and displacement of the retina (detachment from the choroid) near atrophic portions, are the two chief dangers to which the myopic eye is exposed.

DESCRIPTION OF THE PLATE

Illustrating Mr. Bader's paper (Seventh Series) on Myopia. Region of the Yellow Spot.

Fig. 1. The optic disc and the region of the yellow spot of a shortsighted (right) eye.

The uniform red part of the fig. represents the blood-carrying portion of the choroid. To the right, near the margin of the fig., is represented the oval-shaped (long axis vertical) optic disc, with the retinal vessels diverging from it. These emerge near the margin of the optic disc, furthest from the yellow spot, as is often seen in myopic eyes. Skirting the margins, opposite the one from near which the retinal vessels emerge, we find a white crescentic-shaped figure with black pigment-spots; the figure shades off into the adjoining red portion of the choroid; in books it is termed the crescent or posterior staphyloma of the shortsighted eye. The large, round, white figure (the sclerotic and atrophic choroid and retina, sprinkled with black pigment-spots) to the left of the optic disc represents the region of the yellow spot in a state of extreme atrophy. Healthy red choroid surrounds the atrophic portion. The coats of the eyeball, to the extent of this figure, are, as the ophthalmoscope shows, staphylomatous, *i.e.* projecting into the orbit beyond the general curvature of the eyeball.

From a shortsighted person, æt. 34. Left eye. Myopia requiring 1-10 for distance. Region of yellow spot healthy. Right eye (see fig.) amblyopic from birth. Retina in region of yellow spot blind to extent of white and black patches (as long as the patient remembers). Lateral parts of retina nearly normal as regards acuteness of sight.

Fig. 2. The region of the yellow spot. Right eye. The bluish-white spot in the centre of the fig. (fibrous opaque tissue), and, surrounding it, the yellowish-white portion, skirted by and sprinkled with black (choroidal) pigment, and overrun by few large blood-vessels, represent an atrophic portion of choroid and retina. Healthy red choroid surrounds the atrophic portion, which exactly occupies the region of the yellow spot.

From a person, æt. 16, belonging to a myopic family. Left eye normal. Hypermetropia 1-50. Right eye (successfully operated on for divergent strabismus some years ago) suffers from impaired sight from birth, the region of the yellow spot being quite blind, the marginal parts of the retina sensitive; the optic disc appeared slightly anæmic; the atrophic coats in the region of the yellow spot were staphylomatous; the rest of the eye, as regards shape, was hypermetropic.

Fig. 3. The region of the yellow spot of a shortsighted eye.

The yellowish-white portion, sprinkled with black spots, in the centre of the fig., represents the centre of the yellow spot in a state of extreme atrophy. It is surrounded by pale, grey-red choroid, indicating a lesser degree of atrophy.

From a myopic person, æt. 53. The high degree of amblyopia in both eyes prevents ascertaining the degree of myopia. Similar atrophic changes are seen in the region of the yellow spot and round the optic disc of both eyes. Part of

the retina, to the extent of the white and black patches in the region of the yellow spot, had perception of light, part was quite blind. The patient never wore spectacles.

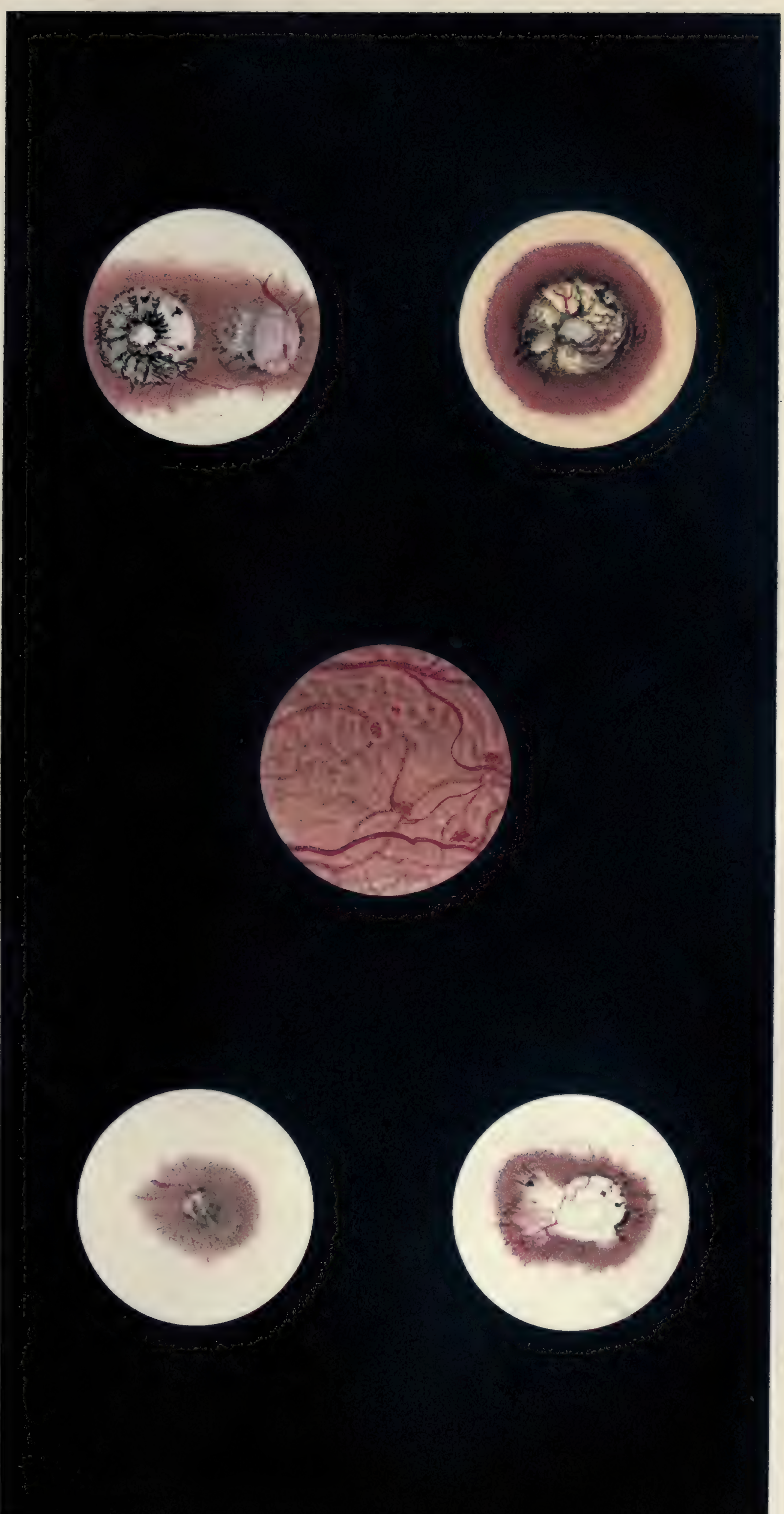
Fig. 4. The region of the yellow spot of a shortsighted eye in a state of extreme atrophy. Right eye. Few tortuous retinal blood-vessels pass across the atrophic portion, which, towards the left, shades off gradually into the adjoining choroid and retina.

From a nearsighted patient. Left eye otherwise healthy. Right eye blind in region of yellow spot; sensitive to light in peripheral parts of retina. Sight failed suddenly some years ago with photopsia and objects appearing crooked, followed within a short time by loss of sight in the yellow spot region. Patient never wore spectacles.

Fig. 5. The region of the yellow spot of a shortsighted (left) eye.

Numerous large retinal blood-vessels are seen passing from the right to the left in the fig., with few blood-spots among them. The choroid (the brown and red patches) beneath these retinal vessels is in an advanced state of atrophy, especially near the lower margin of the fig. (The more the white of the sclerotic shines through the red of the choroid the higher the degree of atrophy of the choroid is supposed to be.) The brown-red patches represent groups of stellate pigment-cells. The intervening light-red spaces (the veins of the choroid) appear paler, broader, and further apart from each other, the more the choroid is distended.

From a shortsighted person, æt. 23. Left eye highly amblyopic from infancy. Right eye requires 1-3½ for distance. Ophthalmoscopically little difference exists between the region of the yellow spot of the two eyes. The sight of the amblyopic eye was much improved by excision of a piece of cornea, thus flattening the remainder. The crescent adjoining the optic disc was small in both eyes, but the general distension of the tunics was very great. Patient never wore spectacles.



ON THE

PATHOLOGICAL NATURE OF TUMOURS.

By WALTER MOXON, M.D.

THE very great increase in our knowledge of the microscopic composition of tumours may justify one in an endeavour to consider how far this fruitful study of their anatomy has essentially changed their general pathology; and I will venture to take occasion to examine whether the doctrines we were taught as to the origin of tumours, and their relation to the constitutions they arise in, need to be altered, after all that the last few years have discovered regarding them.

First we shall find that the old preliminary difficulty in defining tumour has not grown any less. Indeed, it is even more hopeless than ever, so that if any advantage has been gained over that difficulty, it is in our learning to avoid and circumvent it, acquiescing in this easily enough, since defining tumours does not either prevent or remove them.

The benefit derivable from ever so clearly defining, is one that refers only to the correctness and quickness of our views; and such quickness and correctness of insight is more trustworthily secured, when we apprehend the reasons that render tumours pathologically undefinable.

There can be no doubt of the value of the word *tumour;* it often enough most usefully satisfies a patient that one should pronounce his trouble to be a tumour, when if one wrinkled the brows in doubt which -oma it might be, he would wander off unsettled.

What is a tumour? The word says swelling, tumeur, geschwulst; and there may have been a time when that was all that was meant by it, but one does not now call every swelling a tumour. Thus the common unsightly swelling of the face, from carious tooth and abscess, is never called a tumour. Yet the exactly similar appearance caused by growth from the gums or facial bones is a tumour. Again, ascites is never known as tumour, and that not because it is better known as dropsy, for the limited dropsy of hydrocele is called a tumour. So that swelling is not what is meant by tumour, indeed some of the most dreaded tumours often shrink the part they attack: as, for instance, scirrhus of the breast and certain puckering cancers of the peritoneum.

But to go no further in this obvious way, it will be well to notice why it is that there is such difficulty in defining a tumour. There must be some reason, either in the tumours, or ourselves, or our relations to them. The reason is that all our language arises out of some practical aim, and our words are fixed for practical uses. Language is the expression of the classifications people make for real purposes, and they classify according to what they are going to do with the things concerned. Thus, a botanist divides plants into endogens, exogens, and acrogens, because he wants to think about them accurately. But a gardener divides them into trees, shrubs, herbs, flowers, and weeds, because he looks to their appearance in beds and shrubberies. While a greengrocer or cook dealing with the most uncompromising appetite, cuts them at once into vegetables and not vegetables, so that any that won't boil are not vegetables at all. Again, a doctor divides them into medicinal, poisonous, and indifferent. Thus, the meanings of the names follow the practical wants of those that use them. Now a pathologist, trying to define a tumour, is like a botanist trying to define a shrub, and neither can expect to succeed. A shrub is not meant to be botanical or scientific; it is "what would grow in a shrubbery;" and so "a tumour" was never meant to be a pathological or scientific term, it means an obstinate, persistent unmanageable swelling, that wants removing if possible.

But though the word has only this rough general meaning, yet the things its meaning compasses, can be so far considered

together that we can recognise the common characters which have given them their common name.

The things that are called tumours have the following set of characters:

1. They arise by a new centre of growth.
2. They organise in solid continuity as they grow.
3. They persist.
4. They form circumscribed, or, at least, easily determined swellings.
5. They are abnormal (or the above characters would include the fœtus, if not the several organs of the body).

Now this is, I think, the best way of solving the question, "What is a tumour?" The *beau idéal* tumour would include all these characters. Such a tumour as an adenoma of the breast, or sarcoma of the bone. No one would hesitate to give the full force of the word tumour to such a growth as possessed all these characters.

But many things that lack one or more of these characters are still called tumours. Thus:—

1. Some tumours have no new centres of growth, but are enlargements of existing parts, such as splenic and glandular tumours.
2. Some tumours do not undergo organization, such as ranula, wens, hydrocele.
3. Some shrink the part they grow in, such as scirrhus and peritoneal cancer.

So that many of the things called tumours correspond but partially to the standard of the most perfect tumours, which develope from centres, and organise themselves like new organs in the frame; and thus they lose many of the characters of those perfect tumours, until you reach such structures as syphilitic gummata and large tubercles, which you would scarcely call tumours, and yet hesitate to deny the name. The lines of natural distinctions are not like lines of Euclid's definitions, but have breadth almost equal to their length, somewhat more like shepherd's plaid. The most agreeable and attractive mode of introducing the general consideration of a large subject, is by tracing its origin from the dawn times of early ignorance, up through gradual illumination due to successive great minds, until the full light the author throws is

finally opened upon it. For the history of tumours this has been skilfully done by Virchow. No doubt a great and also a gradual advance in the knowledge of morbid growth, has occurred since the time when tumours were regarded only from such points of view as their external shape affords, and so were called tubercles, or polypi, or fungi, according as they were lumps or pendulous masses, or had a soft substance; or else from their consistency were called hygroma, melioeris, or atheroma, or colloid, according as they were watery, or like honey, pap, or glue.

But at these times it would appear that the natural soft substances or flesh of the body were quite equally in the dark, and such knowledge as we now have of the minute constitution of the tissues, was so far off, that it was a step or slip in advance when the simple tissues such as fat, or bone, or gland, were recognised, and their occurrence in the form of tumour was perceived. When so little was known about the normal tissues, and especially when their developmental changes as we now follow them were not dreamt of, any classification of tumours according to their resemblance to normal soft parts must have been very coarse. Pathology must follow physiology at some distance. The science of variation from the law prerequires the knowledge of the law.

When at length the fully developed tissues were studied, and tumours were carefully looked at, the history of opinion regarding them forthwith took a very obvious course. It was seen by all experienced men that some tumours are like natural tissues of the body, and some are not like those tissues. And so a great division into tumours *like* and tumours *unlike* the tissues was immediately made, and these two kinds have ever since been constantly recognised. Several writers have had varying expressions for these great kinds of tumours, but they amount to little more than different ways of saying the same thing. Authors took slightly varying standpoints, and named these divisions of tumours accordingly with a slightly varying import.

Dupuytren gave the name *accidental* to tumours like the tissues, and *sui generis* to tumours unlike the tissues, because he thought these latter had a peculiar nature of their own. And when one did not know that hydatids had an independent course of life as distinct animals, this conception of a peculiar nature in tumours, would be confused with much of our present

notion of parasitism. In this view regard is set on the superficial characters of the developed growth.

In Lobstein's language the two kinds became respectively *homœoplastic* when like and *heteroplastic* when unlike. This view had regard to the component substances of the tumour, the first kind being made by a euplastic, and the second by a cacoplastic lymph.

Lebert used the terms *analogous* and *heterologous*, believing in a properly specific form for the elements of each sort of heterologous or unlike growth. His view looked more to the microscopic character of these formed elements, than to any presumed bad characters of the lymph, such as was supposed by Lobstein.

What these earlier authors meant when they spoke of likeness and unlikeness in tumours, was a very important distinction, which we are in danger of seeing refined away in the present day. When a tumour is removed, and you find it is made up of real cartilage, or fat or bone, then you are able to say, "This tumour is composed of a substance with whose nature I have much acquaintance, I know what it is, and in the body I constantly meet with its harmless tendency." And this knowledge is so reassuring, that one would desire to see it preserved without any weakening of its force.

But this simple and clear view of likeness and unlikeness became confused when microscopic examination revealed the existence of cells in unlike tumours, cells which in their several stages of change offer resemblances to the growing elements of natural tissues. The unlikeness of the tumours called unlike, was then seriously implicated. For although a tumour growing in muscle might not be like muscle or any other full-grown tissue, yet the cellular elements it consisted of were often very like the elements that muscle is made up of in its early stages of development.

By this discovery, although the likeness of the "like" or analogous tumours remained untouched, yet the unlikeness of the "unlike" had its scope limited to a *non-resemblance to the adult tissues.* Thus it soon came to be said that all new growths are like some tissue in some stage of its development, so that a universal likeness or homology was disclosed, and unlikeness done away. This view has been opposed,

through misunderstanding or misstatement, yet it is among the actually obtained acquisitions of our knowledge, the truth of which cannot be gainsayed; and the only question is, what are the limits of the application of this truth? I think these limits are very narrow; and, from a practical point of view, this discovery should not be allowed to do away with the old and natural and true distinction of tumours that are like and tumours that are unlike the normal complete tissues.

Surely too much has been made of the discovery! It may be unquestionable that the structure of every kind of tumour when viewed by the microscope bears a resemblance to some kind of natural structure in its course of development. But such a likeness to an undeveloped substance is much less of a likeness than a likeness to a developed tissue. A developed tissue, such as fat, is not indefinite, but has character about it; its characters make it quite unlike any other thing, so that for a tumour to be like fat shows you something of its real ultimate actual nature; such a tumour *is fat*, and it will behave like fat innocently; on cutting it out you rejoice to see that you know all about it; you say "That is fat, and I know what fat is and what it will do," and you are content.

But how different it is when, on removing a tumour, you find it composed of cells that are like the growing cells of young muscle. You cannot then say, "This is muscle; I know all about what it will do."

If you reflect a little, you find that even the knowledge that it is like fœtal muscle is attended by another knowledge, that it is like fœtal brain. Now, whatever good is it to know that a growth is like fœtal muscle and also fœtal brain? For one cannot help at once seeing that *a thing that is like two different things may be as different as these things from each other;* and how really different are fœtal brain and fœtal muscle! True, the eye does not see much of this difference, but that is very little to the point. They *do* differ, as you learn when they go on developing and their several natures are disclosed. If you only look at eggs and ovules, you will acquire very useless ideas as to identity in animals and vegetables.

When one finds a tumour to be like fœtal brain or muscle, or fœtal things in general, one has no such satisfaction as that felt in discovering that a tumour is like bone. *For we know*

what bone is and what it will do, but we have no precise knowledge of what fœtal things at large will do. One will do this and another that, and likeness to several of these has only this value, that it forebodes active increase, which is the common character of all fœtal things. In short, the microscopic likeness to fœtal tissues is of no advantage at all, it is got at by stripping off all the characters that make tissue definite and true to kind.

Definite character *has gone,* and has left only certain round or caudate cellular forms, which are not endowed with features enough to give grounds for any useful distinction among them. In the normal tissues such elements go steadily on to become muscle or brain, but in tumours they do not do so, and one really learns nothing by their pointless likenesses.

They may be *like* fœtal brain, or muscle, or connective, but their history shows that they *are not* fœtal brain or muscle, or connective, for they do not go on to form those tissues, and we do not want to know what they are like but what they are.

At least we must see that while we know that fat *is* fat, and we only know that sarcoma is *like* fœtal muscle, one is an identity, the other a resemblance, and a resemblance that the normal course of development plainly shows to be entirely deceptive.

Hence the comparison of some tumours to the fœtal tissues can only be a convenience, and should not be placed on the same level as the identification of others with perfect normal tissues. This applies even a good deal to the class of the so-called myxomas which really are not at all like any permanent substance of the body, and if like the fœtal connective show little tendency to develope into connective tissue.

The highest credit is due to those who have drawn the parallel between the developmental stages of normal tissues, and the permanent forms of morbid tissues, but it is going too far to say that the morbid are of the same nature as the natural fœtal tissues. The general arguments that are advanced to support such a proposition are equally fallacious. It may be quite true that whatever happens to a human body will be a human accident, and that, as Virchow says, man's tissues will never grow feathers or cherry stones, but the whole of human possibilities are surely not necessarily exhausted in normal development. The substance I described under the name periangeioma,

or the tissue of the tumour called cylindroma, is surely quite as unlike anything that occurs in the normal human histology, as any one thing in the histology is to any other thing in it.

Again, however satisfactory to ourselves it may appear, to be able to trace the gradual development of the histology of tumours as a line of advance, here and there diverging, but in the main coming on to the position we now occupy and feel to be commanding, I believe it is not yet secure to indulge in such agreeable retrospect, if it indeed ever will be. Shall we not see, that to thus represent the course of opinion as advancing in one line of progress, is only the part of an advocate of one view, who aims to exclude others? I think it is more right to admit that during the whole time in which this subject has been intelligently studied, there have been several competing general views taken from several aspects of the history of tumours, and that the real value of these views is not yet settled.

Leaving the time when pathology as we now know it did not exist, and looking to the opinions which were held by men whose views of the anatomy and physiology of the body were comparable with our own, we shall, I think, notice that four distinct kinds of influence or power have been by different people supposed to act in producing tumours.

1. There has been thought to be a state of mixture of the blood, such that the substance of the tumour comes out as a residue, when the other organs have taken their respective shares of nourishment. We may call it chemical depositism.

2. An organising power in the blood, so that it actively pours out material that forms a tumour; this we may call hæmal formativism.

3. A growing power in the solid elements of texture which creates the tumour by augmenting such elements, and this we may call parenchymatous formativism.

4. Lastly, there has been recognised a kind of parasitic nature in the life of the new growth, a view we may call parasitism, of course with due apologies for such clumsy titles.

I do not mean that these views came in such an order of succession in time. For I believe that in one form or another they are always to be traced coexisting, and that even at this day we must allow these four kinds of view to be no more than so many just and necessary acts of recognition of certain phases of tumour

formation, and that it is still a question what their relative importance may be.

Indeed, each of these views has its separate history, though the histories overlie and are intermixed with each other, for, unfortunately, although they really are quite distinct, yet their distinctness has not been borne in mind during the long continued discussion on the general subject of tumours.

I hope this confusion will become no longer possible, and I will now proceed to state the nature and compass of each of these views, but will take the last first for the sake of convenience of statement, because the other three have more immediate relation to each other.

Parasitism.—Perhaps this view is best expressed in the words of Harvey, who compared cancers to the ovum when he had recognised the independent life of ova, and said that tumours *quasi propria anima vegetativa nutrire et crescere.* He so gives them a distinct part of the animal life or soul to govern their formation, and puts them in opposition to the general *anima* of the body, without carrying the view of their distinction so far as to think them other animals. Somewhat different from the opinion thus expressed by Harvey, was the idea that tumours and tubercles arose through changes in parasites within the body. Jenner had made some very correct observations on the hydatids of the pig and sheep, and had partly traced the changes which occur in them, and which they gave rise to in the tissues. The results of these changes we know, in such instances as decayed hydatids of liver, to be of a kind resembling masses of caseous tubercle tolerably closely. Cystic disease in the chorion and some forms of cyst in the ovary also frequently resemble clustered hydatids in a very remarkable way, so it is not wonderful that, at a time when the life-history of hydatids was unknown, some physicians should have arrived at very hasty conclusions respecting this resemblance, and have generalised in such a way as to suppose that the origin of tumours and tubercles should be set down to changes in and about hydatids. Thus Dr. Adams divided the hydatids into lymphatic, bloody, and carcinomatous; describing carcinoma of the breast, for instance, as a fungus called into existence by the irritation of hydatids, the fungus forming a nidus around the broods of hydatids to preserve and nourish them. From his point of view the cancer

was considered to be still hydatid to the last, not undergoing transformation into cancer, but causing the cancer to come from the tissue of its host. A kind of process such as we may often see in the vegetable kingdom, as on a rose tree, for instance, where one may often find three sorts of galls upon the same bush, all produced by irritation of gall-insect-maggots, one kind being hairy galls, and the other two kinds round smooth galls.

Barron, of Gloucester, supposed, on the other hand, that the hydatids did not persist in the form of distinct animals, but were transformed and changed to the substance we recognise as tubercle or tumour. Especially he viewed tubercles in their supposed vesicular stage, as young hydatids about to undergo degeneration and become solid.

Views of this sort still crop up among the ignorant and the charlatan, but since our knowledge of parasites has grown into helminthology, the conception of tumours as parasitic must fall back into the form in which Harvey enunciated it. Indeed, what Harvey said about tumours, in the above quotation, is as true as ever and just as important, only we do not now pay any regard to that aspect of their nature. We turn away our face from the question, what vital spirit it is that makes the tumour grow and organise itself in its own peculiar way, just as we refuse to consider through what genius the liver grows and organises itself in its own peculiar way. We look now at analytic detail, and classify according to microscopic appearance. But the compilation of the parts of the tumour, the distribution of vessels to its interior, the formation of gland duct, bone, teeth, &c., in it, instance its vital organising power. And although we may not have found it much good to urge the question, "What power it is by which they do these things?" (so that we have relegated it to the same limbo in which are lost in confusion the cognate question—How such and such organs take such and such shapes), yet *some forming power does produce each tumour;* and that power is largely of the same nature as the much ignored powers that govern the development of the normal organs; and among these ignored powers the tumour-forming power takes in a way the place of a parasite, in that it is an organism foreign to the nature of the body, and subsisting at its expense and peril.

8. *Chemical Depositism.*—The chemistry of compound fluids, and especially the mode in which the several constituents of a compound fluid gather themselves apart under the circumstances of their crystallization, offers an analogy which bears very promisingly on the difficulties of the genesis of solid tissues out of blood. And when organic chemistry is ardently realised, with admiration at the light it has thrown on the nature of living processes, there arises a hopeful inquiry to discover the peculiar solidifying principles of various living growths, and so place these growths in a line of continuity with crystals to share all their clearness. Hence there has been much chemical treatment of tumours, and great expectations of finding the peculiar matter (say carcinomatin) of cancers, but with no good result; it was, indeed, like boiling up eggs to learn how feathers were formed. Chemistry, no doubt, is as much like life as convex is like concave; so like it, I mean, as is needed in order to be the exactly intimately destructive opposite. There is no special chemistry of tumours; nothing peculiar has been found in them, if you exclude such matters as retained secretions or degenerative changes producing cholesterine, &c.—producing, that is, dead matter, not living growth. There is no chemistry of living growth. But though experimental search for such chemical matters is now very much given up, and a realised basis for a chemical view of tumours is wanting, yet such a view of the origin of new growths is still vaguely tenable, and has among its exponents some of the greatest names in pathology. In this view the blood is considered as though it were a highly complex chemical mixture, out of which the solid parts separate in such a way that each one of them is the residue left by all the rest; so that, for instance, if you could take out of the blood everything except hair, you would then find hair left. If to this conception of the nature of the blood, borrowed, apparently, from the process of reducing sea-water and obtaining its salts, you add another borrowed also from the process of crystallization, namely, that each of these residues has a tendency to take a certain proper shape after the manner in which every crystallizable substance in sea-water has its shape, then you have an analogy for the process of tissue-formation which you cannot altogether overlook. This simple view, when well stated, and supported by facts taken from the relations of tissues in their

periods of development, may be read with much pleasure even when the end arrived at is not conviction. The best class of examples supporting it are those coming from the relations of the activity of the sexual apparatus with the growth of ornamental or bellicose appendages, such as whiskers, horns, or plumage in males of different kinds; but besides these there are some other grounds for the supposition of chemical depositism.

If I might give my opinion on this view, it would be to urge as strongly as I am able the incongruity between this coarse analogy and such an application of it. The difference between sea-water and blood is as much more than mere thickness as the American captain so justly relied on. It is a difference which is infinite, and although to select points in it incurs the danger of inferring that in other points there is agreement, yet we may notice this as one vast separation between crystallization and tissue-formation. The salts of sea-water are known in other conditions and can be got in other ways. The conditions of their formation into their proper shapes can be prescribed accurately and prevented exactly, so that when we talk of them we talk of things the conditions of whose forms we do really know. But when we talk of the blood as a mother-liquor, undergoing fractional crystallizations on unknown principles, or depositing tissues like silt, we have not any power of showing that the forms which arise out of the mother-liquor are *forms belonging to the composing substances in virtue of their constitution.* It is true they have a chemical constitution, and chemistry will have its way in its proper sphere, but everything that has a chemistry is not chemical; a piano, for instance, is full of chemistry, yet it is not chemical. Chemistry is a very aggressive science, and has a levelling tendency. In point of fact, however, chemistry is essentially statical, while life is dynamic. The chemist reduces everything to a balance of forces; and if he had his way, everything would find its natural affinity and join it, and remain fixed until something that did not care for chemistry came to make things move on again. The shapes taken by animal tissues are subject to no chemistry. It is right to say that *it is only as dead, they have any chemistry at all;* chemistry follows life afar off, and takes up the dead letter of its living utterance as insensitively as a blind man feeling pictures, having

no faculty for the force of the thing. Chemistry is brutal in the province of living action. It has nothing to rise to the necessities of the position. It boils eyes to learn why they see, and its way of thinking of the brain is as though the brain crystallized out of the blood, and then took to reflecting upon its own mother-liquor.

Nevertheless a tumour is a substance, and when cut out and held in a surgeon's hand is a mass of nitro-oxyhydrocarbon, and therefore is at least *then* chemical. I fear that few will believe with me, that it had no chemistry at all until he cut it out and it fell dead into albumen and fibrin, or that lifeless mass from which those chemistries are outboilable. Indeed, tumours must be viewed in one aspect as substances, and as chemical substances to be held subject to chemical laws. This is their dead side, and so much of their history as is learnt in this point of view must afford grounds for a chemical depositism. But how low is such a view! It can take of the dust of the ground, but so far from breathing a breath of life into the dust, cannot even crystallize nostrils out of it. Chemistry cannot deal with the life of tumours, and they grow by their life.

2. *Hæmal Formativism.*—This view in its original form is almost as simple as the one just considered. The solid is here also assumed to rise out of fluid, but the conditions of origin are not here limited by the analogy of dead chemistry. The view is best studied in Hunter's works, and one is almost persuaded by his powerful statement of it. The foundation of the idea is the broad generalization that "the living principle belongs to almost all the fluids of the living body." Oil is said to have it in the least degree; the chyle is shown to possess it; in semen it is, of course, apparent enough, and the fluid of the egg offers a sufficiently convincing example. "But," says Hunter, "the living fluid which has the greatest tendency to assume a vascular structure when thus collected or effused is the coagulable part of the blood."

It must be noticed that Hunter's doctrine makes no particular account of the constituents of blood, and is ignorant of white and red corpuscles, viewing the blood as a fluid with a "coagulable part."

We shall have to consider the alterations in the scope of this view, which are necessitated by the discoveries of the blood-cells and their changes and wanderings. From Hunter's simple point

of view many important discussions were formerly held concerning the organizing power of the blood. A contest soon followed on the practical question whether blood was useful in wounds and fractures, and this, though the strife in discussing it was sharp between Abernethy and Lawrence, yet was but one of many very important questions of the same general kind, all asking, "Does the blood directly form tissue." This was especially inquired as to the clot in the ends of ligatured vessels, or the clot in the cranium in cases of extravasation in the arachnoid. It was contended, on the one side, that the blood itself went through organization, while on the other side it was thought, that the blood was passive, or even injurious, except as creating inflammation whereby lymph came, and organized while gradually displacing the blood-clot.

These questions have now undergone a certain degree of solution, so that they are almost overlooked if not cleared up —I should say not fully answered, in so far that no one can say whether the organization which unquestionably occurs within the compass of the clot, is an organization of the blood or some adventitious matters added to it from parts around, and permeating it. But no doubt exists that the blood-clot does become organized, so far that vessels form within it. Indeed, the history of organization of thrombus has grown into a rather long chapter of pathological histology. I have many specimens of organization of clots in the veins, and of organization of thrombus in the arachnoid, the vessels opening freely from the clot into continuity with the vessels in parts around; but I cannot make out, nor see how any one else can make out, whether the vessels were formed from the blood-clot or from juices instilled into it from surrounding parts.

In the special case of tumours it was thought by some that they had met with stages of formation of blood-clots into tumours. Thus, we have, in Guy's museum, an example of cavernous tumour, put up expressly to show a supposed stage of blood-clot on the road to cancer-formation. The appearance of these cavernous tumours or patches in the liver, is so like blood half organized that the question was sure to arise. The weight of Rokitansky's opinion is curiously divided on the subject. That author, in his text, says that his experience shows there is no association of these cavernous tumours with cancers (and the

preface says the book is written from an experience of 40,000 inspections); but a footnote says the author's *subsequent* experience has led him to alter that statement, and hold that there is an association of the cavernous tumour with cancers. I have once seen such an association, but the patches are not infrequent. As to transitions to cancer, these nævoid patches, like cutaneous nævi, are capable of undergoing regressive solidifying change, which might easily be mistaken for cancer. Yet these patches never behave like tumours, swelling and thrusting aside parts, but rather the spot looks sunken, and has often an angular outline, the tissue being simply replaced by wide capillary vessels.

But if adventitious cavernous tissue probably does not turn to a tumour, so as to support the original and coarse view of hæmal formativism, which supposed that the blood is in some vague way a life-producing fluid, it is otherwise with some natural cavernous tissues, such as the spleen.

Let us recall the manner in which the blood has to make its way by passing at hazard through tracts of splenic pulp from the arteries to the veins. All authorities agree that a part, at least, of the circulation in the spleen is so effected.

Now let us consider the blood thus out in the parenchyma, and then remember the exceedingly swift increase of splenic tissue which we so frequently see in hypertrophy of the spleen, and we must allow that for organization into spleen substance at least the blood has surprising aptitude.

Very similar relations hold place between the lymph stream and its glandular organs, including tonsils, &c. The lymph finds its way at hazard through the interstices of these bodies, and under some circumstances is capable of very swiftly forming a great quantity of the gland tissue, leading to rapid enlargement of the gland, &c. True, it is more customary to view this as an augmentation of the gland independently, or through irritation due to the lymph; but we are fully entitled to view it as intravascular formative action, and consider it as evidencing a formative power in the intravascular stream.

And it must not be supposed that this observation only concerns the spleen and glands. The discoveries in the anatomy of connective tissue, especially in relation to the origin of the lymphatics, which late years have brought out, place the

question of hæmal formativism in a new and important light. Thus, it is now very certain that the blood-corpuscles, both red and white, are capable of leaving the channels of the vessels by passing through their walls, though these are still entire. And it is known that the common connective tissues contain corpuscles identical with the white corpuscles wandering through their spaces, while here and there, in many parts of the connective tissue, are aggregations of the same kind of corpuscles forming with a filamentous intercorpuscular substance little patches of "adenoid tissue," as they are called by Dr. Burdon Sanderson, who has ably described them.

When we put together these facts, first—that the blood lets out its white corpuscles from the vessels; second, that these wander in the tissues; and, third, that aggregations of such corpuscles form knots in different parts—we certainly have an amount of evidence in favour of the origin of growths by variations of this process, such as it would be impossible to pass by lightly.

We must not as yet, however, assume that no further questions remain concerning the several things that now are known to exist in connective tissue. No problem is more difficult of solution than the normal condition and anatomy of connective tissue. You have in it—1. The network of connective-tissue-cells. 2. The interstices between the fibril bundles. 3. The commencement of the lymphatic capillaries. 4. The vessels with the wandering white cells. The relations of the first three of these are undecided. I believe the cell network is solid and not tubular; and the interstices between the bundles of connective form the commencement of the lymphatic capillaries, and contain the wandering white cells, which are liable to collect in heaps here and there. But the problem cannot be solved off hand. My attempts to arrive at a certain conclusion have always left me in doubt, and the published accounts conflict much so far as they concern human and higher animal tissues. The interstitial connective parts of crustaceans, &c., however, show the above relations of their lymph-like circulation so evidently that there is, I think, strong ground for believing the same to be the truth in higher animals also.

All this shows that the blood must still be viewed as capable of yielding to the tissues an organizable material, and it must be sup-

plemented by the knowledge we possess concerning the growth of cancer in the blood-clot within the vessels and heart, showing that the substances of the blood can make growth like any other tissue. Thus, cancer grows with fearful rapidity within the great veins, and that without implicating their walls to an extent at all proportionate. I have found the whole portal system of veins except the lower intestinal branches, stuffed like sausages with soft cancerous growth of exquisite structure in a case of cancer of the stomach invading the gastric vein; other examples of less striking extent one frequently meets. Twice I have found cancerous matter growing in clots at the apex of the right ventricle. One of these had two cysts of brown fluid in it, though the wall of the heart was scarcely perceptibly effected; the mass, as large as a plum, projected freely like a common *ante-mortem* polypus into the ventricle; the transition from common fibrous clots to well-formed cancer structure could be very interestingly followed in the more superficial parts of this mass. Mr. Skey described a case of cancer on the valves of the heart, in just the place where large clots are deposited in rheumatic disease. We hence know that the blood is capable of taking a very active share in the formation of tumours.

While we can assure ourselves of the existence within the vessels, and passage out of them, of living corpuscular elements as gifts from the vessels effused with the fluid into the textures, we may, perhaps, also get a certain help towards apprehending the vast possibilities of our subject of inquiry by glancing at the view Mr. Darwin has promulgated under the title of *pangenesis.* He thinks the facts of life demand of us some belief of this sort. That there is an active reciprocity of the several tissues, so that the elements of one tissue discharge into the circulating stream myriads of buds that exert an influence on remote elements according to their kind. If we enlarge our ideas to embrace the possibilities thus suggested, we should regard the blood as the sum of influences that the tissues exert on each other, so that effusion from the blood would become of indefinite importance in its bearings on our question of hæmal formativism.

So it can easily be seen that the course of recent progress is not to do away with the importance of the blood in tumour formation, but rather to increase the number of ways in which

the blood may influence the texture to produce tumours, offering us new inquiries which must be investigated and answered.

But when we have had solidism presently under consideration we shall see that hæmal formativism does not now differ from parenchymatous formativism, as the old "fluidism" from its opposite "solidism." I mean that the blood contains solids as well as the parenchyma, and the question whether the blood or the tissue forms tumour is not any longer the question whether the tumour comes from fluid or solid. The blood is full of solid cells endowed with the same vital powers as parenchyma-cells, and to that extent the blood and parenchyma are both alike capable of a solidist pathology.

The old simple identification of blood with fluid does not hold now. What then? Is fluidism done away? Has the law of fluids no importance in the pathology of tumours? We shall see that this is far from being the case. I will discuss the question presently and show that, although hæmal formativism has so changed that it can be held in a solidist sense, yet this can only be done by taking a restricted and partial view, and we must see that the fluidist part of the old hæmal formative view remains as true and as important as ever .

3. *Parenchymatous Formativism.*—There are many well established evidences of the pathological multiplication of the cells in the parenchyma, so that no doubt can be entertained that such a cause exists for, and is efficacious in producing, pathological swelling. But while I say this I am bound to draw attention to the serious discrepancy in the confidently given descriptions of those who are the chief authorities on the subject. For instance, take the description which Virchow ('Kr. Gesch.,' B. ii) gives in his account of the leukæmic liver.

"Die microskopische Untersuchung ergiebt überall eine aus den Bindegewebs-Elementen hervorgehende Wucherung." This decided statement of the multiplication of the connective-tissue-cells to produce the new cells formed, is a long way from harmonising with the account given, for instance, by Rindfleisch, who says that, since the discovery of the wandering of the white cells, it grew likely that leukæmic tumour would prove to be such a wandering. "Dazu kommt aber, dass auch der histologische. Befund einer Auswanderungtheorie durchaus das Wort redet," thus affirming that not the new theory, but rather direct observa-

tion, proves the new cells to have wandered out of the vessels. Or take the marvellous discrepancy between von Recklinghausen's results and those of Cohnheim on the comparatively very simple question whether the wandering cells in the frog's and rabbit's inflamed cornea arise by the multiplication of the fixed stellate cells; one giving as his direct observation that the fixed cells are seen multiplying, while the other gives it as his direct observation that they show no sign of it.

One may take the liberty of saying that such discrepancies in the accounts of those who can be sure in such doubtful affairs, enable one to bear one's own uncertainty with far greater equanimity at those times when, looking carefully, one cannot really tell whether they do divide or not. Indeed, one cannot think it wrong to express some surprise at the strong statements that are made on such doubtful grounds.

Excluding, however, doubtful cases, and leaving them to be fought confidently and much over in the future, as they are sure to be, for misdirected confidence generates its own recoil, we can find some cases of undoubted multiplication of the natural connective tissue elements in the formation of pathological products. Such instances as I have seen most certainly, are the multiplication of the corpuscles in the arterial coats in atheroma, and the multiplication of the corpuscles of cartilage in inflammatory affections of the joints. Yet even here I think it has not been openly said that *there are some cases in which the cartilage is ulcerated, and yet the corpuscles are not in a state of multiplication.* I have seen this on several occasions. The cells had perished more or less, and yet had not multiplied in cases of acute inflammation. This may prove a very important field of inquiry, if we are ever to reach a knowledge of the cause of difference between inflammation and growth.

The result is, indeed, far from reassuring, when one endeavours to review the opportunities one has had of really being sure that parenchymatous cell multiplication had occurred in any specimen. There is one source of fallacy which I have never yet seen alluded to, and which invalidates, I think, all such observations as are usually cited to prove multiplication of connective elements in inflammation. This fallacy will need that one refer for its comprehension to the complex structure of connective tissue. I have already said that connective tissue consists (1) of

the well-known bundles of wavy fibre; (2) of interstices between these, in which white corpuscles wander; (3) of the stellate cells of connective tissue lying in these interstices, and more or less filling them according to the rarity or density of the tissue; and (4) of lymphatic capillaries and lymph-spaces from which they arise. Now, as the connective-tissue-cells lie in the spaces between the fibril-bundles, and these very spaces are themselves the lymph-spaces, and lymph-corpuscles wander in the said spaces, the conditions are such that in the more solid parts of connective tissue *the cells will form impediments to the lymph-corpuscles in their passage through the spaces, and the lymph-corpuscles will collect around the stellate cells.*

Well, but the only evidence we have of multiplication of connective-tissue-cells is that we see several round cells where one stellate connective-tissue-cell should be present. No one ever saw the stellate cell divide. *Now, as the stellate connective cells, which are not very determinate in form, may gather lymph-cells, that is, inflammatory corpuscles (for they are undistinguishable) around them, how are we to know that any collection of such inflammatory corpuscles in the places of the cells has not arisen in that way, especially when we find the lymph-spaces full of these inflammatory cells in other parts?* Since this fallacy has become apparent to me, the grounds of Virchow's views of inflammatory cell multiplication in connective tissue have felt very unsolid, and I am disposed to think that in inflammatory action the connective cells do not participate in such a way as to produce lymph- or pus-cells, but I believe that their action is limited to the reproduction and restorative growth of new substance when repair is required. And this view, I protest, is based rather on reasoning and analogy than on direct observation. I have never seen the cells multiply, even to restore neighbouring lost connective.

But although the above fallacy disqualifies all evidence of parenchymatous cell multiplication in the actions of acute inflammation, yet my conviction is quite the opposite in the matter of tumour formation. I think nothing is more certain than that the *cells of tumours* multiply in the growth of the tumour and produce that growth. Every microscopic slide of tumour-section is full of evidence of such multiplications. You see the cells in every degree of division, and no doubt can remain that these

degrees are stages in a process that was proceeding when death overtook and stopped it.

It is not so easy to discover whether the *natural* cells of the parenchyma of tissues multiply to produce tumours, and consequently authorities have differed very much on this matter, though certainly not wanting confidence in their several readings of the difficulty. The view most widely received now is that urged by Virchow, viz. that tissues undergo a hypertrophic increase by multiplication of their elements, and that the tumour growth is innocent when the new elements are true to the parent kind; but when the multiplication of the connective tissues is accompanied by metamorphosis, so that connective cells give birth to cells of the epithelial or lymphoid kind, then the growth resulting has a malignant character, proving infectious to parts around and metastatic to parts remote. In this way nests of epithelial cells are thought to take their rise from the connective cells, and so to occupy the interstices of the fibre-bundles which they have pushed apart, giving rise to that areolated appearance of meshes full of epithelioid cells which constitutes a carcinoma. In other cases the connective cells multiplying produce forms like those of fœtal muscle, and so a rapidly growing sarcoma arises.

But another view now competes, which ascribes the rise of cancer-cells to the epithelium of the lymphatic channels, and relies chiefly for the proof of such origin on the configuration of the rising masses. The drawing which Rindfleisch copies from Koester will, no doubt, familiarise the English reader with this view, and it is a view which, through the present active inquiry into the structure of lymph-channels in connective, is destined to play an important part in future discussion. Fig. 5 shows the kind of distribution I allude to; the columnar-knotted figure of the cancer areolæ suggests tubes filled with the cancer-cells. These tubes used to be thought to represent attempts at the composition of a glandular structure, and they are very like it. It is, however, scarcely possible that both views can be true, so that they would be both glandular and lymphatic at the same time; yet Rindfleisch adopts Koester's figure and description for epithelial carcinoma, and afterwards describes these carcinomas as being of the same nature as adenoma, making adenoma and carcinoma structurally so far identical as to throw them together

in his division of tumours. But no one has advanced the proposition that gland-acini are formed by epithelium creeping into lymph-spaces. That would resuscitate the bygone notions of Darwin's 'Zoonomia,' &c., where the gland-ducts are made to be open, elaborated ends of the lymph-vessels.

Thus a parenchyma-cell pathology by no means offers us a simple solution of tumour formation such as Virchow's followers were hoping to find in it; but we have from it two entirely distinct sources of tumour-cells even in the simplest parenchyma, and that when we have excluded the wandering white cells of the blood.

But we have already seen that there is really now no distinction of a cellular pathology from a hæmal pathology, since the blood, too, has it cells. It would appear that the distinguished author of the cellular pathology reached the hold on the professional mind which he obtained by turning too much away from the cell life of the blood itself. He treats the cell life of the blood as derivative from the spleen and glands, the elements arising from which, once in the blood, he no longer sees as capable of forming morbid growth.

However it may be explained, the result of his system was the limitation of pathology to a solidistic view far too exclusive to compass the whole truth of the matter.

Indeed, at the present time hæmal formativism and parenchymatous formativism no longer contrast as though they were non-cellular and cellular pathology respectively. Nevertheless, fluidism and solidism contrast as strongly as ever. For the old question, "Is it the fluid blood that causes tumour, or is it the solid texture that begets it?" remains unsolved, so far as it concerns the fluid part of the blood and not its cells. Let us consider how we now stand in respect of that question. We must see that the question "Is it the fluid blood that causes tumour?" is an unclear question; indeed, this question is double, and must be divided into "Is it the fluid dissolved and formless part of the blood, or the solid growing and living cells of the blood, that cause tumour?" We must see that these two separate questions are united in the question "Is it the blood that forms tumour?" And when we ask "Is it the blood or the parenchyma that forms tumour?" we must divide that question thus:—First, is it the dissolved part of the blood, on the one hand,

or, on the other, the cells either of blood or parenchyma that form tumours? This is the true question of fluidism *versus* solidism. As a second question, it may be asked, is it the cells of the blood or of the parenchyma that form tumour? But either way the answer to this question is solidism. Now, as to the latter solidist question we can without difficulty settle our present position, for the question whether blood-cells or parenchyma-cells form tumour is advancing towards its solution.

The microscope has certainly shown us that there are cells in tumours, and that the cells of tumour multiply and increase the tumour by their increase of numbers. But whether the germs are originally sown from the blood-stream as it flows, or arise off the native cells, by a *lusus naturæ* in the course of their normal formation, we have never seen now, any more than Hunter had seen; yet our position in the inquiry is improved greatly through our knowing something of the seeds of tumours. We have reason to believe these are cell-nuclei, and hence we know what it is we want to know. Our question is, Do these nuclei come in the blood or arise in the tissue? We believe firmly that, whichever way they come, they must descend from the cells of blood or tissue by budding from these, and thus the solidist part of our problem is just like that which a botanist would have before him if, upon an island in a river, already planted with herbage, new species of plants should arise. The botanist's conclusion regarding the origin of these plants would depend on their nature. If they were very unlike any of the old flora he would conclude that the seeds of the new plants came in the stream and lodged there, and, if pressed further for an opinion whether they properly belonged to the land or the water, he would consider whether they are land plants or water plants. If they were water plants in the marshes of the island, he would say, The river plants are come into the island; but if they were known to him as land plants elsewhere, he would say, The stream has brought some seeds from solid ground above; or, again, if he did not know the plants, and they were of undecided habitat, he would have to leave the question of the nature of the plants in doubt, and could not tell whether they were water plants from stagnant marshes in other parts of the river system, or land plants cast elsewhere into the stream. On the other hand, if the new plants were closely like some of the

old flora of the island, and differed only in size or habit of growth, he would conclude that a sport from some of the existing species had occurred.

As pathologists viewing the origin of a new tissue element in an organ or part of the body, we are precisely in the same position as the above botanist in regard of the question, Has the new growth arisen from the blood or the texture? The blood can throw out cells to form it, but it can bring also germs of solid texture from parts remote borne in its current; and, again, the solid elements of the part in which the growth appears are capable of sporting into forms within a certain limit of likeness to the natural elements there.

Now, when we try to settle whether the new growth is of the part or of the blood we must, and we do, decide by the same process as the botanist; we botanise the question, whether we are right or wrong in so doing; and we say (1) These cells are white blood-cells; they are surely from the blood (see Rindfleisch on 'Leukæmic Liver'), just as one would say, These are water lilies—they are surely from the river; or (2) we say, This is bone in the lung; it is surely from that bony tumour in the leg (see Wilks on 'Cases of Malignant Osteoma'), just as one would say, This young oak must have been an acorn or cutting from up country; or (3) we may say, This is an uncertain kind of material—we don't quite know if this is from blood or texture (see Paget on 'Fibro-cellular or Myxoma'), just as one would say, This new kind of veronica is either a land or water species, we can't well say which; or, finally, we say, This fat in the connective has come as a new growth of the usual fat (see the general opinion on lipoma), just as one would say, This giant geranium is a gigantic sport we have just got from a batch of geraniums here.

So nowadays we botanise our way through the difficulty, which is quite right if the subject-matters are *strictly* analogous, and quite natural if they are analogous *as far as we see*, and so, indeed, they are, to all intents and purposes which regard the origin of tumours from blood-cells or tissue-cells.

So that, in short, we have to consider each case separately, and judge whether the tumour came from blood-cells or tissue-cells, from a special consideration of the resemblances and conditions of origin in each case.

But does this solve the whole question of the origin of tumour from blood, as Hunter asked it? *It does not,* and we may as well see that it does not. What we have done is to separate some answerable points in his question, which, when answered, teach us no longer to ask the whole question any more as one question. But what is left of the question? This—that we do not investigate the change in the fluids. We take the analogy of independent living forms, and apply that analogy, and in doing so we use the assumption that the tumour elements have an inscrutable vital nature like that of a plant which we never think of explaining or understanding.[1]

But Hunter did not mean to stop so. *His idea of the blood had in it the germ of our ideas of chemistry as well as of our ideas of vital form,* and so far as Hunter thought the blood chemical so far it would appear to him, as a fluid that *would some day be analysed and known,* and, indeed, from his view the notion of chemical deposition did arise. So that when he asked and thought to answer the question, "Is living tumour from the blood?" he did not only mean "Does the blood carry life as a fish-pond carries fish?" but rather, "Cannot we find out that part of the blood's constitution which makes it grow tumours, so that we can know that part and purge it away, as we cleanse a fluid from chemical impurities?"

[1] But Hunter did not mean to stop so, the idea we have reached is that of the union of *life and form,* and in reaching this we have let go the view that tumours may take shape as the union of *chemistry and form.* There is an immense gulf between the relations of chemistry on the one side, and of life on the other, to form, though both living things and chemical shapes alike have definite forms. One difference is this, that the form in chemistry is static, but form in life is dynamic—I mean so that in a chemical form the components are as permanent as the form, while in a living form the component elements are changing while the form remains. The living shape is the shape of motion, like the circle of light made by a catherine wheel. The chemical shape is the shape of cessation. And chemical shapes—shapes of cessation—being motionless, can be taken and analysed because we start from known conditions, and are undisturbed by considerations of motion from unknown sources. But the strange motion from an unknown source which creates living forms makes these to be infinitely different. We cannot take living forms as we do chemical forms and analyse them in the same way, because our processes stop the *motion that is the form,* and we begin our analysis on what is not living but dead already, and hence chemical and static. In other terms, in our vain attempt to analyse the dynamic motion of life we seize the motionless form whose movement was life, and then we represent it in terms of chemistry, whose proper province is motionless and dead form. The life has entirely escaped us.

Our present cellular pathology, as I have shown, botanises the difficulty, and does away with the notion of chemical impurity, replacing it by that of sowing and budding creatures, and so refuses to consider the chemical aspect of the difficulty.

But another turn of our analogy from botany will show that the other aspect of Hunter's hæmal formativism, the aspect which would make the tumour-producing change follow the laws of unliving impurity is quite probable even when we have arrived at ever so pure a cellular pathology.

Let any one visit a greenhouse and see such a fact as is just now under my observation. There are twelve hyacinths; eleven of these are in pots, and one is hung up in an ornamental basket. The former are regularly watered, but the latter is too often forgotten by the gardener, in spite of remonstrances. What is the end of it? The unfortunate bulb that is high and dry in the basket is smothered over with hateful-looking black flies, but not a fly is on the eleven which are flourishing prettily in the flowerpots. Now, why those black flies? I cut sections of the leaves of the sickly and of the healthy plants respectively and find nothing whatever in the sickly plant that differs in form from the parts composing the healthy ones. Yet there *is* a difference; and if not a difference in formed elements it must be a difference in the fluids. In short, there must be a fault in the fluids of the infected hyacinth. But look at the result. The disease reveals itself, not by fluid change, but by *formation* of ugly black organisms all over it. See, then, how a pathology of complex organic forms may be the result and index of a very simple fluid change. My hyacinth only wants water to escape the plague of black flies. Or take the ordinary cases of oidium on phthisical tongues, and we see, though here the fluid change is less easily known, a most interesting fluid pathology.

And, after this, let us again ask, which is the first cause of tumour formation—the fluid or the solid changes? We can now see it is probable that the cellular forms *may grow in any tissue, because its juices favour such forms.* So that fluid change favours tumour formation, while living growth determines it. And thus we conclude that it is a mistake nowadays to set hæmal formativism in opposition to parenchymatous formativism and that the question is altered to this:—"What do the chemical changes of the fluids of the body do towards tumour formation?"

And what, on the other hand, do the living forms contribute?" And the answer is, that each has its well-defined sphere of action. Neither must be overlooked, both must be carefully inquired into. There is nothing at all irrational in the hope of finding drugs that will render the fluids bad cancer-manure, but there is a real folly and narrowness in the opposite view which would think the knife the *only* means to be thought of in our opposition to cancer. For we have seen that the analogy of living growth properly considered leads us to expect that the state of the fluids will determine the body into such a state that cancers grow in it as aphides grow on a badly nourished rose tree. It is only in this way we can at all understand the action of what is, perhaps, the most certain cause of cancer, namely, grief or worry. This may well be supposed to change the juices of the body so that they anticipate their part of the creative conditions of cancer cells.

These four views, then, which I have called chemical-depositism, hæmal formativism, parenchymatous formativism, and parasitism, are all true at the present time when held within their proper relations, and each must be maintained in its proper province.

For it is probable that (1) the nature of dissolved matters in the blood may favour or induce their deposition in the solid form as tumour; which is chemical depositism. And (2) that the sperm wherefrom growing elements of tumour take their rise, may be in the blood and pass from it out into the tissue; which is hæmal formativism. And (3) that the things that are started into activity by the spermatic elements from the blood are the cellular elements of the parenchyma, which play the part of germs and are vivified from the blood; which is parenchymatous formativism. And, lastly, that parasitism is so far true that to create the structure of any special kind of tumour-structure, a *vis formativa* or *anima*, such as Harvey supposed, may be really in action, however much we find it conduce to a self-satisfied materialism, to turn our faces away from all that aspect of the affair, and content ourselves with spying out the elements and their arrangements; just as one who had no mind for strategy and tactics would only see groups of soldiers in an army.

There are indisputable facts which favour each of these

propositions, and it is easy to see that these propositions by no means conflict, but rather all of them tend together to make up a rational theory of tumour-formation.

But in thus adopting all the rival creeds into a sort of pantheon one comes into collision with any views which regard one particular creed to the exclusion of the rest.

Of course it will not be necessary to refute every system which takes its stand in favour of the sole dominance of one of the four views which I have enumerated, because the statement I have made of the other three is a sufficient general protection against exclusiveness.

But there is one system which I cannot pass by without great consideration on account of the vast weight which its author's name most rightly adds to such arguments as enforce it.

This system teaches that cancers are specific diseases, in the sense that they originate in a change in the blood. Presuming, as I must, to separate the arguments from the weight of authority which enforces them, I must proceed to show that they are inconclusive.

These opinions are thus expressed by Sir J. Paget,[1] "I believe cancer to be constitutional in the sense of having its origin and chief support in the blood, by which the constitution of the whole body is maintained; and I believe it to be specific in the sense of being dependent on some specific material which is different from all the material constituents of the body, and different from all the materials formed in other processes of disease, and in the sense of its presenting in a large majority of cases structures which are specific both in their form and in their mode of life."

It is thus rather as a declaration of belief than as a certainty sustained by argument that the ground is laid out. On such a footing, the advantage of well-merited authority is so great that unless we can take the question away from its field, into argument where the commensurable merits of the question are debateable, I must nurse my opposite belief in silence. But evidences are given for the view by the following plea, which deserves to be placed in a fuller light. The plea stands thus: "The evidences for the hypothesis that cancer has its origin and chief support in the blood appear in the conformity of cancer to the other specific diseases for which a similar hypothesis

[1] 'Lectures on Surgical Pathology,' p. 766.

is nearly proved, and in the fitness of the terms which it supplies for the general pathology of cancer."

Now, considering that the question before a surgeon when the origin of cancer is considered is no less important than this, "Have I a right to remove this cancer or must I let it alone?" one would expect that there would have been an attempt made to decide the question whether cancer arises in the blood, and is constitutional, by reference to the history of cancers themselves, and not by delegating the inquiry to a chapter in which little mention is made of cancers, and which, as I shall show, contains scarcely a trace of matter applicable to their history.

I will examine how far cancers correspond to the characters and theory of specific diseases, and believe I will establish these three fatal objections to this view:

1. That those characters are not distinctive of any set of diseases that can be distinguished by them from common diseases, for even wound-sores show many of the characters.

2. That, whether this be so or not, it is certainly true that wound-sores show a greater proportion of these characters than cancers. Cancers are, in fact, singularly deficient in the majority of these characters.

3. That the want of only one of these characters on the part of cancer would place the argument which associates cancer with specific diseases in the light of such a fallacy as could not be allowed in any inquiry.

I trust the importance of the question will justify me in placing here in a condensed form that statement of the case to prove the blood origin of cancer which is given by our greatest authority in surgical pathology; and as even then it must be rather long, I must ask my readers' patience. The distinguished author referred to commences his account by saying that specific disease is understood to mean disease that deviates from the character of simple disease.

Then he evidently has a difficulty in saying what is a simple or common disease, for nothing occurs to form a standard of a common disease but the effects that follow injury by violence, chemicals, or fire.[1]

[1] These we generally call injuries, not diseases. They differ from what are called diseases in this, that the external factor or cause whose agency created the injury is known as a foreign thing and left out of account, so that the healing

Taking such results of injury as the standard of common disease, it is said that specific diseases consist of these common diseases with additions of other peculiarities which make them specific, and then a general view of the points in which specific diseases differ from common ones is put forward. These points are stated as follows:[1]—

1. Each specific disease constantly observes a certain plan of construction in its morbid process, as in the shape and mode of extension of syphilitic ulcers, psoriasis, or typhoid ulcers. In each of these cases the phenomena admit of distinction into those of common disease, and those in which such common disease is peculiarly modified or specificated.

2. The best examples of specific diseases have remarkable causes; a peculiar organic compound is introduced into the blood by inoculation or contagion, and the patient feels ill all over before the local disease appears.

3. There is an apparent want of proportion between the couse of the disease and the effect, as compared with the proportion seen in injuries and poisons.

4. There is not a correspondence between the constitutional and local disturbance in point of severity; here syphilis and cancer are specified.

5. The specific diseases are often symmetrical, and have seats of election.

6. They are prone to spread locally beyond the area of application of the cause.

7. They are capable of self-augmentation; here secondary and tertiary syphilitic eczema, herpes, and carbuncle, are specified.

8. They undergo metamorphosis; here syphilis in its stages is instanced, also the successive phenomena of fevers.

9. They change in their transference by inheritance or

processes make up all the disease, whereas, in spontaneous diseases, the factor corresponding to the wounding agent is not known, or not known in the same direct way, and hence is kept in the account; so that disease, as distinguished from injury, includes the unknown injurious agent. Indeed, in the following statement it will be seen that "common disease" means injury from traceable causes, and "specific disease" means injury from causes not traceable, so that the argument we are examining consists virtually in an endeavour to prove that all spontaneous diseases arise in the blood, or in other words, that all local adventitious evils not traceable to external agency are caused by changes in the blood.

[1] 'Lectures on Surgical Pathology,' pp. 355, et seq.

infection; here cancer is specified as changing from scirrhous in a parent to medullary in offspring.

10. Time is an important element. They are periodic, and measurable in time.

These being the ten proper features of the group of specific diseases, the theory of their nature says that the local changes are caused by deposit of matters previously existing in the blood. As to proof of this theory, it is simply declared obvious in the contagious inoculable diseases, smallpox, &c., and nearly obvious in the contagious but not inoculable diseases, typhus, &c. But that it is less complete for other diseases not communicable, including a large series of such as cutaneous eruptions, hydrophobia, tetanus, boils, &c.

It is necessary to see that boils, tetanus, cancer, &c., stand to the specific theory in this curious relation. That there is another class between cancer, &c., as the one extreme, and those to which the theory is obviously applicable, as the other, in which intermediate class the theory is *less obviously* applicable. Cancer thus is left with the remark that the obviousness of its specific nature is in *a third degree of lesser completeness;* and no proof or explanation of these statements is offered, or any definite value set on the completeness or incompleteness of the proof in the vitally important case of cancer.

But at once the theory goes on to show how *if we assume that such a "little specific disease" as a bug bite corresponds with those various disorders from typhus to boils,* so that something is introduced into the blood, and there undergoes increased transformation, combination, separation, and excretion, we can then explain how the ten characters arose.

This latter step, however, has no power to support the assumption it starts from; it only shows what advantages the theory would offer if it were true; it does not show the truth of the theory.

This step, then, being no support of the theory in question, as applied to cancers, we will leave it, and attend only to the argument, which I will paraphrase thus:—"That because some diseases possessing certain ten characters are obviously diseases of the blood, therefore other diseases possessing some of those characters are deducibly, though less obviously, diseases of the blood.

I have already said that these views are put mainly in the form of a profession of belief; so far as they are of that nature, they would command the most respectful consideration from me. It is only in so far as they wear the form of argument that I deal thus with them; and I am bound to say that the above, which I believe conveys the plea quite correctly, is a very fallacious semblance of an argument.

That cancers possess *some* of the characters possessed by fevers does not show that cancers have any *special* point in their nature in common with fevers.

If a certain group of characters possessed by fevers collectively show them to be blood diseases, and cancers possess only some and not others of those characters, then the absence of the missing characters may be due to cancers not being blood diseases.

Now, the fallacy becomes much greater when, instead of the fevers possessing all the ten characters of which cancers possess only some, the fevers themselves are devoid of some of the ten characters which cancers in their turn possess.

Yet this is, indeed, the actual state of the case. The examination of these ten characters, which I will now make with the object of inquiring (1) whether they apply to fever, (2) whether they apply to cancer, and (3) whether they apply to wound ulcers, will prove that very few of the characters of fever are possessed by cancers, so that the general plan of the argument basing the blood-origin of cancer on an association with fevers —truly blood diseases—by a community of characters is simply an example of a dangerous fallacy.

Let us look at the ten characters in a more condensed form:

1. A plan of construction in their processes.
2. Contagium and priority of general effects.
3. Disproportion of cause and effect.
4. ,, general and local effects.
5. Seats of election and symmetry.
6. Spread locally, and are erratic.
7. Self-augmentation.
8. Metamorphosis in individual.
9. ,, transmission.
10. Periodic times.

Now we will consider the bearings of each of these counts upon the characters of fevers, cancers, and wound-sores respectively.

1. *Plan of construction* may refer only to the configuration of the diseased changes, or it may include in its reference the whole life-history of the disease. If we take the first meaning, and limit our consideration to the configuration of morbid change, then it is true that cutaneous eruptions and other specific affections have their own proper forms, but have not common diseases their own proper forms also? Are degenerations specific diseases? What is more well-figured than arcus senilis or microscopic fatty degeneration of muscle or artery? True, they take their figure from pre-existing forms, but so do acne and lupus, &c., so do typhoid and tuberculous ulcers or dysenteric ulceration, &c. How few specific processes take defined shape, except by affecting particular elements of tissues. What, too, is more pronounced in its characters than phalangeal enchondroma? in what way can cancers be said to have a plan of construction, that enchondromata have not got, in their way, also? And even wounds, are they not divided into punctured, incised, lacerated, &c. &c., according to their configuration? (we must not say "plan of construction," for that is only an adventitious term, and means no more than configuration; there is no *plan* nor *construction* in the matter). *As to proper figure,* there is no difference between a wound or factitious ulcer, an arcus senilis and a typhoid ulcer. Each has its figure, and we know the cause of the mere figure. The difference lies here, that we know how the figure came to be tracked out by the wound, and we think we know how it came to be tracked out in the degeneration, but we do not know what tracked it out in the fever. Yet that ignorance surely gives us no reason for assuming that the cause was in the blood.

If we take the second meaning, and assume that "plan of construction of the morbid processes" refers to the whole life-history of the disease, then, indeed, what such plan of construction can be more well defined and constant than the plan on which a common wound heals. The times of its phases might be marked on a dial. And if a wound is severe, what is more definite than the plan of the fevers, primary and secondary, that arise in consequence? The range of temperature follows laws

quite as defined as those of contagious fevers, for one must remark, in all candour, that though wound fevers vary somewhat, yet the hæmal theory of disease is hardly entitled to claim that "each specific disease *constantly* observes a *certain* plan." One only wishes it were so; but, in truth, whose experience does not sorely teach him the opposite of this? Specific fevers are subject to the greatest variations. The plan is a mere average among widely divergent individuals.

Or again take the history of the several mineral poisonings. Thus corrosive sublimate kills about the seventh day, arsenic sooner; phosphorus differently, yet each with a plan of its own. If against these be placed chronic pompholyx or lichen, which the hæmal theory places among specific diseases, the converse proposition might appear the truer; and we might say common diseases (reaction and repair) have definite plans of construction, while other diseases are arbitrary and unaccountable in their ways.

Hence we see that the first count applies to wounds and fevers, but it does not apply to cancers, except in common with cartilaginous and other tumours, from which it is intended to distinguish them.

2. *Contagion and priority of general effects.*—Now, contagion is limited to a few fevers, which are, no doubt, truly diseases of the blood in the same direct way that pneumonia is disease of the lungs; that is, in a way wholly different from that claimed as true in cancer, &c. Cancer is not contagious. The experiments of Alibert, who inoculated himself and his pupils with it, have proved this; so that wounds, &c., share their relation to the contagion with cancers themselves. But as to priority of general effects how far is this true of typical eruptive fevers? Let us consider the processes that follow vaccination. The poison is introduced, but the child is quite well for days; there is no sign of the blood having received any taint. At length what happens, the *part injured* swells up, and forthwith the child is more or less poorly, but local disease is limited to the wounded spot.

Here then is a typical specific disease which we are able to make very exact experiments upon as to its origin, and we find that the local effects precede and govern the general; so also in syphilis, the sore hardens its base long before the slow diluted fever

enters on its tardy career. Is it not just so also in cases of common wounds when they are severe enough to excite surgical fever, which is probably due to the absorption of matters from the wound. The fever itself, if severe, often reacts on the wound and causes it to become unhealthy, and so general effects come to have a causative relation to local, even in the simplest wounds.

Thus this second count is not applicable to vaccine, syphilis, and other specific diseases, unless on such grounds that the ordinary course of severe injuries equally falls under it. It does not apply to cancers.

3. *Disproportion between the cause of the disease and the disease itself.*—Now, although the hæmal theory allows here the exceptions to be numerous, yet it claims that we must "admit the existence of many rules or laws, the seeming exceptions to which are more numerous than the plain examples of them;" yet surely we must be guarded in our dealing with laws that are repudiated more widely than they are obeyed. We need only mention gout as a type of a class of specific diseases in which the cause is proportioned to the effect. Cancer again, so far as we know, corresponds to its cause. But without considering these examples do we not find that severe scarlatina, for instance, will hurry five children of one family into their coffins, while mild scarlatina will scarcely make five other children of another family take to their beds. So from cholera: if it be grave in any house or street, how few escape with life as it falls on one after another; whereas if mild in its type it is commonly lightly borne by each who in succession comes under it. So that one may see in scarlatina and cholera gravity of cause inducing successive effects grave in proportion, and levity of cause producing effects mild in proportion.

On the other hand, in the healing of wounds in different people are there no varieties? I mean apart from erysipelas, &c. Do we not find that the constitutional tendency and power of the individual—his state of health, &c.—make vast differences to arise in the proportion borne between the injuries and their results—differences for which we cannot often find explanation, though we say they are constitutional. Or what proportion is there between epilepsy and its cause? Is epilepsy a blood disease? This count then applies to wounds as well as

fevers, and not at all to cancers. I shall enter more fully on this in the next count.

4. *Disproportion of general and local effects.*—In smallpox and dysentery the danger is in proportion to the extent of local disease. Those fevers in which there is an evident disproportion between local and general effects—such as typhus and agues—are surely true blood diseases in the same sense in which gastritis is stomach disease; and they must not be taken as having characters wherefrom to argue upon truly local disorders like cancers and cutaneous affections. Indeed, fevers are local in the blood, the blood is their local and peculiar seat. Now, of cancer it surely cannot be said with any confidence that its general effects are disproportioned to its local effects. The pains, hæmorrhage, &c., the amount of decaying tumour tissue absorbed, the infection of vital viscera, surely explain the cachexia of established cancer, while in the early stages of cancer, persons do not usually show any special appearance.

Thus, the 4th count does not include cancers, or if, in deference to the authority of Sir James Paget and others, we allow that there may be some doubt of this with regard to some instances of cancer, let us see whether common diseases do not at least equally show a disproportion of general and local effects. Continuing to take wounds as our example of common diseases, what is more remarkable than the variety in extent of constitutional mischief accompanying operations of equal severity? Thus Billroth says that in twenty among seventy-seven cases of severe operations and injuries there was no fever at all, and that neither the part affected nor the extent of the wound governed the extent of the fever, and even the healing by first intention made no difference to the fever. These conclusions he came to while making careful thermometric observations on the laws of traumatic fever. With these facts before us can we conclude that healing wounds show a constant proportion between the local and general diseases they involve?

Count four then excludes some fevers, includes many wounds, and probably excludes all cancers—certainly most cancers.

5. *Seats of election*, and *symmetry*.—As to seats of election, simple tumours, enchondroma, lipoma, exostosis, &c., are remarkable for their constancy in choice of certain seats. Wounds also have in a sense seats of election, since they occur

most frequently upon the most exposed parts; and it is curious that Virchow should give statistics to prove that cancers, also, are distributed in the body with a certain proportion to the exposure of parts to injurious agencies; while Mr. Hutchinson offers to show how an epithelial cancer can be made on one's lip by smoking, &c., so that cancers and wounds are very much on a par in point of seats of election. As to symmetry, it is enough to say that cancer is not symmetrical in its development; while, to be sure, the best attested instances of symmetrical disease would be cases of degeneration, such as arcus senilis, arterial disease, and its consequences in apoplexy, &c., which in no sense could be regarded as specific. Nay, is it not probable that when specific febrile disorders produce their symmetrical eruptions, the symmetry is due to the local nature and liabilities of the skin, &c.; surely it is a strange thing that one should say with Mr. Hutchinson, that symmetry of eruption is due to blood change. Why! the blood is always going round, and equally so in all parts, and its effects would be universal, not specified in parts symmetrically. The solids are symmetrical, and the blood is not symmetrical except for the solids, and all symmetrical effects must be due to solids so far as they are symmetrical. Indeed, one would think symmetry of effect would go to show a solidist pathology of fevers, and not a fluidist pathology of tumours.

Seat of election, then, includes simple tumours and wounds along with cancers and fevers. Symmetry excludes cancers along with wonnds.

6. *Spread locally and are erratic.*—Can these characters be said to mark any special kinds of diseases that can be called specific? Thus, as possessing these characters, one would mention nervous diseases, especially of the spasmodic kind. Even wound-sores, too, will often extend locally; one sees death from suppurative cellulitis how often! Common catarrh, too, goes from nostril to nostril, from tonsil to tonsil, and yet what is simpler than a common cold, which one can catch at will, or in spite of will, by sitting in a draught at any time. Then, on the other hand, as examples of the most specific diseases that do not spread locally, see the rashes of the fevers; one and all, when once out, they do not spread locally.

This count, however, although we see that it has no peculiar

relation to specific diseases (being untrue of the best examples), yet is in a way true of cancers, for they do spread locally; and though they cannot be said to be erratic, like gout, rheumatism, and erysipelas, (since they do not relinquish the part attacked), yet they undergo metastasis to remote parts. We must again observe that, in the mode of their metastasis, they show a strict parallel to the occurrence of pyæmia from wound-ulcers; and metastasis in this sense is by no means an example of erratic characters shared generally by such specific diseases as gout and rheumatism.

So that this count includes cancers only as far as their career is identical with metastatic accidents of suppuration, while it excludes the blood fevers which the hæmal theory is seeking to ally cancers with.

7. *Self-augmentation.*—If by this we mean the augmentation of the *poison* in the bodies of persons under contagious fevers, then this character has no application outside the range of those fevers which, we have remarked, are diseases localised in the blood. They would serve very well to set up a great distinction between them on the one hand, and cancers, wound-ulcers, agues, or gout on the other. But if by it we mean the augmentation and spread of the *disease* in the affected person, then this count does not differ from the last, in which we have considered the local spread and the metastasis of diseases.

So that this count, so far as it is distinct from the previous count, does not apply to cancers more than to wounds, and does not apply to fevers, or else only applies to them.

8. *Metamorphosis in individual.*—If by this we mean only the phases which a disease presents in its continuous course, then I cannot see but that this count is included in the first count, as showing the plan of the disease in its development. It then applies to wounds; but if, instead of such continuously successive changes, we mean the starting up of new manifestations of the disease, which are different from the old manifestations, then, surely, this does not apply to cancers, but together with it,—

9. *Metamorphosis in transmission* has its scope limited to syphilis, so far as we are able to speak with any confidence. It is true that many diseases have a vague reputation for alternating with others; thus phthisis is said to interchange with

mania as a hereditary disease in certain families, also gout with rheumatism; but these are only shady opinions, not worthy of mention in a strict inquiry.

The hæmal theory does say that different forms and seats of cancer come to light in the hereditary diseases of infected families, but would not surely press this, seeing that it is even doubtful whether cancer is commonly hereditary at all. In the few striking instances that I have met with of a decided family disposition to cancer, the organ affected and the kind of cancer were the same in the several cases of each set.

Mr. Bryant ('Practical Surgery,' p. 738) says, "Out of 222 cases of my own it (hereditary influence) was traceable only in one of every ten instances." In many other affections, even the most innocent, as large a proportion might be found; and when we consider that cancer belongs to late life, and that long life is itself hereditary, so that it would bring with it liability to cancer, I think there is little reason to consider cancer of itself hereditary, and that, at any rate, no conclusions can be founded on so doubtful a point.

10. *Periodic times.*—This surely forms part of the first count, indeed it makes the most striking feature of plan of construction in the morbid processes. I have already pointed out that the healing processes of wounds and the fevers that accompany them have certain relations to time, at least as constant as the relations of typhoid fever to time; indeed, much more so. But, on the other hand, cancer is the disease of all others that is most utterly without relation to periodic times.

Hence the tenth count excludes cancers, while common wounds are included in it along with the specific fevers.

Summing up now the relations of these several counts to fevers, wounds, and cancers respectively, I will place the results in three columns for immediate reference, using the word yes or no when the count certainly applies or does not apply to the fever, wounds, or cancers; the word conditionally when it only conditionally applies; and the word partially when the application is only to some of the fevers, or wounds, or cancers:—

	Fevers.	*Wounds.*	*Cancers.*
1st count .	Yes. . .	Yes. . .	No.
2nd „ .	Conditionally .	Conditionally .	No.
3rd „ .	Conditionally .	Conditionally .	No.
4th „ .	Partially .	Partially .	Doubtfully.
5th „ .	Yes . .	Yes . .	Yes.
6th „ .	No . .	Conditionally .	Conditionally.
7th „ .	Yes . .	Conditionally .	Conditionally.
8th „ .	Partially .	Conditionally .	No.
9th „ .	No . .	No . . .	Doubtfully.
10th „ .	Yes . .	Yes . .	No.

From this it appears that of the ten characters only one applies in the same sense to fevers, cancers, and wounds; four apply unconditionally, two apply conditionally, and two partially to fevers; three apply unconditionally, five apply conditionally, and one partially to wounds; one applies unconditionally, two apply conditionally, and two doubtfully to cancer.

So that these characters are beyond every degree of looseness and cannot be made into grounds of relation for fevers and cancer. They rather serve to bring together fevers and wound-healing, which are allied by them much more repeatedly than fevers and cancers.

Of course, when I come to a result so different from that reached by exponents of the hæmal theory, it must be that we hold the propositions before us in different lights. The difference is easily seen; it is this, that the endeavour to establish specific disease, gives regard only to a slight cut or small ulcer without constitutional symptoms, as its typical common disease; while I hold it necessary to take not such a trifle as that, which indeed is no disease, and has no character, but to take a great wound and its constitutional results, and, further, to take a properly regardful notice of the really very various courses and characters which such wound-healings display.

It is now time to take another step in the inquiry which will enable us to clear up a great deal of the intricacy and involvement that has hitherto been obscuring our progress. This step will bring us to know what are the relations of "specific," "constitutional," and "hæmal," as aspects of tumour pathology.

I will proceed at once to state the relations of these three

aspects. They are sources of great embarrassment when not clearly understood. These different aspects are the foundations of these three different oppositions of tumours:

1. *Constitutional and local.*
2. *Specific and common.*
3. *Hæmal and local.*

These oppositions coincide with the distinction of tumours into innocent and malignant. It is customary in the hæmal pathology to apply the words constitutional, specific, and hæmal to malignant tumours as though these terms had the same application, while the words common and local are used for innocent tumours as though they were equivalent.

Much circumspection is required in employing for the same meaning different words which already involve indefinite ideas. They may be made to bring a collateral but essentially foreign and unjust aid to a view intrinsically wrong.

The shadowy aid of such vague terms as *constitutional* and *specific* is not trustworthy, when a science is endeavouring to come from the —ology into the —onomy stage, and may we not hope that pathology is now turning to pathonomy?

But these words are still employed in their usual vagueness and wildness, nay, advantage is taken of their flying qualities to entrust to them otherwise indefensible parts of theories.

Constitutional—local.—These words are usually accepted as proper opposites, but it is easy to see that this is altogether wrong. In the first place the constitution is not a very easy matter to grasp in conception and to speak of; it is rather a hazy affair. On the other hand, "local" is definite enough; we can understand very well what it is to be local. Now, if we take some local things we can try how far a local state is in them opposed to constitutional nature. For instance, the liver is local; but surely it would be strange to say the liver is not constitutional. What could any one mean by constitutional who would deny that liver is constitutional? and yet it is local. Every organ or part of the body is in this sense constitutional, in that it arises in virtue of the laws of development; and so far it is a member of the common scheme which is called "the

constitution." This gives a sense for the word constitutional, which we can clearly mean, and which we can express thus—"belonging to the proper nature of the individual," as distinguished from what is engrafted upon him or inflicted on him by vital or destructive influences from without.

In this sense *constitutional* is opposed to *foreign*, and this is a sense requiring such a word as constitutional for its expression. We want to be able to say that such and such disease arises out of the peculiarities of the nature of the individual, one person having a constitutional disposition to react to injuries by slow suppurations, or else to bleed freely, or to be very highly excited in nervous system, &c. By this use of the word constitutional we should keep in view such native peculiarities of the individual, with a due regard to their natural opposition to such peculiarities as those which external agents like smallpox engraft upon him.

This view is based on the truth that whatever takes place in our bodies has two distinct factors—the *intrinsic factor*, which is the constitutional power of the part affected to react by its irritabilities, functional, nutritive, and formative; and the *extrinsic factor*, which is the external injurious agent that inflicts the injury. This may be mechanical or chemical, like that noxious element of city air that makes its victim asthmatic while exposed to it; or it may be vital, like the spermatical agent, whatever it is which forms the contagium of fever, and which has no power apart from the receptive activity in the body, any more than a spermatozoid has any power without the responding ovule. The spermatozoid once meeting the right ovule may create a life, and so, the fever sperm coming into and finding the living frame germinal to its spermatic impulse, is able to create a sort of other life or *parabiosis* within it that unwinds, with terrible ease, the slow laborious coil its proper original life had created.

"Local," on the other hand, is properly opposed to "general," and may be used without any explanation, in this its natural signification, whenever it is wanted.

Specific—common.—I have already examined the theory of specific diseases; the result was to show there is no ground for setting up some diseases as specific and others as common. It

would be altogether strange in science if this were otherwise. Suppose that, in zoology, we had common animals and specific animals, or, in botany, common plants and specific plants. Here I must, however, say that it is held in the *specific theory* that there are no species of diseases in the same sense as of animals and plants.

I confess I do not quite understand how we are to make the distinction; but waiving this we will go to chemistry. Would it not be equally strange if we were to have common chemicals and specific chemicals, or in acoustics to have common sounds and specific sounds. True, we may say there are common sounds in the sense of ordinary sounds; we all use this way of speaking; and among chemical substances some are called common—common salt, for instance—and others are regarded as more properly chemical salts. It is, however, only in a free and everyday way that we make such a distinction; and it is precisely in this way that we can speak of common diseases and specific diseases, just as one would speak of common salt and chemical salts. Some diseases, such as cuts, sores, &c., are so common as to be familiar, and some are of rarer occurrence, and are not known, except by collecting and examining them, which proceeding creates pathology, just as the collecting and examining of other natural things makes the science of those things. So we may have common and pathological diseases just as we may have common and chemical salts. But strictness of comparison takes the commonness away altogether. In science we must call nothing common. It is just as when in studying natural history you come, say, to the class of cats, and you find in it the common cat, the lion, the tiger, &c. Then you are apt to say the lion is a large cat, with a mane, &c., and a tiger is a large cat, with stripes. This is because the common cat is so familiar to you. Of course in a moment we see that a lion is not a cat in the sense of being *Felis cattus;* he is only generically a cat. In other words, the lion has not got the characters of a cat, with an extra mane, &c., making him a lion, any more than a common cat has the characters of a lion, with extra characters making her a common cat. But both have equally some common characters which are *abstract*, *unreal*, selected out by our minds. Now, is it not just the same with the ulcers or tumours or any other group? We see a

venereal ulcer and a healing sore. The venereal ulcer has differences from the common sore, and we are apt to say it is a common sore with the addition of venereal peculiarities; but this is not any more true than as if we said a common sore was a venereal sore with *common peculiarities.* What the two sores have in common are abstract or generic properties; and when they are really before you in any particular sore, common or venereal, then the further characters of wound-ulcer, or of venereal ulcer separate these into distinct kinds, of which you call one common from its familiarity and the other venereal.

So that just as in zoology you have some elaborate beings that it takes half a life time to know all about, and other simple little things that have very few characters; so in pathology, you have some elaborated diseases, and some very simple; but as the zoologist does not say, except loosely, that a hippopotamus is a great pig with hippopotamus-characters superadded, so the pathologist must not say that the healing sore is contained in cancer with addition of cancer characters. There is no more a common sore than a common fish—every sore is of its own proper kind; some more complex and some simpler, but being to each other as complex identities and simple identities.

We all learn to recognise simple healing wounds and healing ulcers by their proper appearances, so that all alike are species of appearance which are known to us in the same way by their own properties. If we go deeply into the question this is how it appears—injuries and spontaneous diseases alike have two distinct sets of factors—an extrinsic set of factors and an intrinsic set of factors. The extrinsic factor is the cause of the damage, and this cause in the case of injuries is known, but in the case of "specific" diseases is unknown, or not understood if known. The intrinsic factor, in both cases alike, is the reaction of the constitution of the person's tissues to the injury, whatever it may be. Now, in both diseases and injuries, the intrinsic factor will have its peculiarities; in no two persons are these quite alike; one says my flesh heals quickly, another, mine heals slowly; one bleeds excessively, one faints, one has high fever. These peculiarities are constitutional peculiarities, temporary or permanent, and are to be opposed to peculiarities that are due to a foreign cause. I have already said that to these the word constitutional is properly applicable; on the

other hand, the only proper ground of opposition of diseases to each other as specific is the extrinsic factor. Specific is a word that is properly limited to the extrinsic factor and its causation, and so we should use the word specific as opposed to constitutional, which is properly applied to the intrinsic factor. This assumes that there are extrinsic and intrinsic factors to all diseases, the one set corresponding to the wounding agent in a case of injury, and the other to the processes of healing; and this assumption I think will be accepted. When we know the external and internal causes of peculiarities in diseased action we shall be able to divide the differences of diseases into

Differences due to external agency = specific.

Differences due to internal agency = constitutional.

One observes that those diseases which are now most confidently regarded as specific are those whose external factor is recognised most clearly, such as smallpox and syphilis; so, indeed, that the word specific has come to be a euphemism for syphilitic. On the other hand, we all constantly use the word constitutional for scrofula and rickets, which are always held to be peculiarities of the system itself, such as Virchow well sums up under the description "vulnerability and tenacity of injury."

Specific diseases, then, are diseases with peculiar unconstitutional and extrinsic causes.

Constitutional diseases are diseases with peculiar non-specific and intrinsic causes.

Of course it is possible that diseases may arise—*nay, they always do arise—by a more or less peculiar extrinsic or specific cause operating on a more or less peculiar intrinsic or constitutional property,* and so are both specific and constitutional; but what I wish to urge is that these two elements should, by all possible means, be kept as far as possible distinct from each other, and never thought to be equivalent.

So far as a disease is specific it is not constitutional, and so far as it is constitutional it is not specific.

We call a disease *specific* or *constitutional* according as the outer or the inner factor is most striking to us.

Again, of course it is possible to make great confusion for a moment by urging that I should say whether peculiar matters arising within the body and there generating peculiar disease,

such as rheumatism or gout, are extrinsic or intrinsic, specific or constitutional. He who urges that objection is thinking of the constitution of the individuals as a constant standard in them, all variations from which are inferentially due to causes with corresponding varieties. Please see that this settles the question without deciding it, and, indeed, by ignoring it. On the same idea of the constitution as a constant which must be influenced by something "specific" to make it vary, scrofula must be due to a like something; and so it and, indeed, on the same reasoning, all diseases are specific, and the individual constitution is a nonentity whose properties are all assumed due to other things called specific. If you do not think *so*, then the way is clear. Rheumatism, if due to poison generated by the individual's constitution, *i. e.* from intrinsic causes, is a constitutional disease, as opposed (usefully) to such disease as mercurial tremor or alcoholismus; and if, pressing further, you say, "Well, but mercurial tremor has its intrinsic side, its constitutional factor as well as rheumatism, so why not class them as equal, since each shows alike a peculiar act of the constitution?" The difference, I reply, lies here, that in regarding mercurial tremor as due to mercury, you assume that the mercury has the power of exerting it *on all constitutions alike,* i. e. *you ignore the constitutional so much as you admit the foreign cause.* When you know that mercury or lead very unequally affects people equally exposed to either, then you are ready to allow that mercurial tremor is partly due to intrinsic peculiarities in disposed individuals, and so far to regard these peculiarities as a constitutional factor of real power.

But the common view, which looks only to the mercury, induces us to ignore the constitutional peculiarity, and so think of the disease as specific rather than constitutional. On the other hand, rheumatism has cold and damp as external causes, and these are so common and cause so many things, that we do not recognise in them the cause of the peculiarities as in the case of mercury with its tremulous result. We are impressed by the constitutional oddness that makes the rheumatic get his fever, while others equally out in the cold and damp escape; and hence we view the rheumatic fever as constitutional in him; whether it be due to a poison begotten in his blood is another question not affecting this one.

We say mercurial tremor is a specific disease, because its outer factor, mercury fumes, so often produce it; and we say rheumatism is a constitutional disease, because its outer factor, cold, so rarely produces it. In the case of the mercury we assume that the mercury has a great share in making the disease; in the case of the rheumatism we assume that the cold has a small share. If it were found that antozone or any other extrinsic agent at all constantly produced rheumatism in all who were exposed to it, we should then regard rheumatism as a specific result of antozone; as it is, we say it is the result of cold on constitutionally peculiar people. If we knew better than we do that this constitutional peculiarity consists in the production of lactic acid, that would not make it less a constitutional peculiarity, nor the disease less a constitutional disease. And if, then, any one, under these conditions, knowing lactic acid to be the cause of rheumatism, but produced by peculiarity of constitution, desires to say that lactic acid is thus the specific matter of rheumatism, I need not enter further into this question, but only say that the word specific, as so applied, is used in a wholly different sense from that in which it is applied to the specific cause of syphilis or smallpox—a sense which limits it to causes extrinsic to the individual. Such causes must have a distinctive name, which the word specific well suits to supply. But matters produced within by constitutional peculiarity are constitutional; indeed, they form the only special mark of that sort of constitution.

Under the names temperament and diathesis, the constitutional factor of disease has been obscurely recognised, the word *temperament* being used to express characters of conformation, which experience has shown to indicate the prevalence of a certain physiological and psychological type in the individual. The characters of the temperaments are generally rather within the compass of physiognomy than of an anatomical or physiological description, and their greatest importance is rather as guiding to a knowledge of the probable use their subject may prove while he is in health than as aiding us to help him in disease. When any constitutional peculiarity is allied to a definite diseased condition, so that one may be sure a tendency exists to such disease, the word diathesis is applied to such peculiarity. The best examples are found in tendencies of

particular organs or tissues to early degeneration or inflammations. The leading idea in *diathesis* is the presence of tendency to definite kind of disease which does not at the time constitute an actual diseased state. An actually diseased state, if strongly pronounced, is called a *cachexia,* so that temperament, diathesis, and cachexia, correspond to the future potential, future indicative, and present indicative of the constitution respectively.

Hæmal,—parenchymatous—or, arising in the blood,—arising in the part. The question of the origin of tumours in the blood or in the tissues of the part I have already fully discussed in the consideration of the different aspects of tumour development. I shall here only remark, that the confusion of "hæmal" with "constitutional" or with "specific" is altogether out of the question. Hæmal is properly opposed to parenchymatous when considering the origin of local changes, for these changes may have been originated by the blood brought to the part, or may have been originated by the elements of the part itself, excited perhaps through nervous or other influence.

When a tumour arises in the thyroid gland, for instance, the tumour may be due to the activity of the elements of the gland, or the spontaneously changed quality of the blood, or something brought by the blood from without. I am only inquiring what have these several kinds of origin to do with the notions "constitutional" and "specific."

If in the blood, the tumour cause may be foreign to the blood but borne along in it, or proper to the blood, and arising in it; in the first case it would be specific, in the next constitutional; and yet, in either case, it would be hæmal. Again, if the parenchyma spontaneously produce tumour, this would be constitutional; but if a matter acting on it brought by the blood from without created the tumour, it would be specific.

So that hæmal origin of tumour might be either specific or constitutional, and parenchymatous origin of tumour might be constitutional or specific; and thus the question of hæmal or parenchymatous origin has nothing to do with the question of specific or constitutional nature; and it is quite wrong to suppose that what is constitutional or what is specific must be hæmal.

The necessity of examining the hæmal theory of cancer has

led me into a long digression. The result of this digression has been to show that the grounds on which it is attempted to prove that cancer is, like fever, a blood disease are altogether without foundation. It was necessary to examine the evidence which is supposed to show that cancer arises in the blood, because if that evidence is sound and sufficient, the belief I hold and wish to support is false. I believe *cancer arises locally through local conditions, and that from the seat of its origin it throws into the blood germs that are dispersed by the circulation in such a way that other regions of the body predisposed to receive them may be infected by their influence.*

But to place this belief in its proper opposition to the hæmal theory of cancer, it would be better to bring in tumours that are not cancers, and say thus:—*There is no original difference between the relation of cancer substance to its seat and to the blood respectively on the one side, and the relation of non-malignant tumour to its seat and to the blood respectively on the other.* But a cancer is a tumour which after it has locally arisen disperses germs in the circulation, while a non-malignant tumour does not disperse germs.

By dispersing germs in the blood cancer becomes disseminated in the body, and reaches any organs predisposed to its reception, the predisposition being due to such organs receiving the blood of the affected part on its return, as in the case of the lung or liver; or else the predisposition being due to special points in the anatomy and physiology of the organs more or less obscure.

Besides this kind of generalization of cancer by dissemination of its germs, there is another of a totally different nature, namely, where many parts of the body all constituting one system become the subject of cancer. Examples of this are frequent enough in melanosis of the teguments, or in multiple sarcoma of the bones of the skeleton. In these cases we are obliged to suppose a fault in the nature of the particular system affected. By no means, however, does this fault point to any disorder of the blood; indeed, such generalisation is not limited to cancers, nay, it is more frequent in enchondroma, lipoma, and other simple tumours, which are as free from suspicion of concerning the blood as any diseases the body is liable to.

This theory of cancer- and tumour-formation, I believe, best corresponds to our present knowledge of the facts of the structure

and history of cancer and other tumours. The supports of it are necessarily of the nature of bases of belief rather than cogent proof. But I believe the bases of belief are sound and strong, so that the belief is true. It always has been, and always will be, that those who think on these questions perceive more or less clearly the identity of tumour formation with normal tissue formation.

Now we recognise that the solids of the body precede in order of appearance the development of the circulating fluid; and also that the blood is not only thus derivative in its original history, but that during adult life those formed elements which give the blood its characters as an organised substance are derived daily from solid organs of the nature of spleen and lymph-gland, and it may be from the marrow of the bones. The recognition of these truths must determine us to regard the action of blood as secondary to the action of solids.

So that while we admit the deposition of peculiar matters from the blood, and the vital phenomena which such matters show when deposited, we yet regard these not as primary acts of the blood, but as subsidiary steps in a process which, besides these lower operations, includes and is governed by the actions of the living and shaped elements of the texture. These elements of texture play a visible part which must be considered in two distinct aspects: first, as the work of the individual elements, and, secondly, as the action of these collectively under some power which it is of no use to ignore, and which gives them their mutually adapted arrangements according to the kind of tumour to be produced.

This is no denial of the share which the blood has in tumour-formation, only a subordination of this share to the higher and original power of the solids. Nothing can be more important to the surgeon than the question whether the initiation of cancer is in the blood or in the solid texture; if in the texture the cancer must be removed as soon as possible; if in the blood such a removal would be useless, if not injurious to the prospect of cure.

I admit, then, that there *may be* change in the blood in cancer cases, just in the same sense as there may be changes in the blood in enchondroma cases; but let us inquire what evidence there is to prove that changes in the blood actually do exist in

cases of cancer or other tumours. We will divide the question as follows:

1. Have tumour elements ever been seen in the blood? We must reply to this question in the negative. Excluding the altogether different condition of embolism by portions of tumours which have found their way into the veins, and pass along in the circulation to plug the arteries, there have been no observations of tumour elements existing in the blood.

2. Have any peculiar chemical substances been found in the blood in cases of tumour? This also must be answered in the negative. No one has shown that the blood in cancer cases differs chemically from ordinary blood, until an anæmic condition sets in as a consequence of the cancer.

3. Is there any peculiarity in those educts of the blood which are yielded in the healing of wounds in cancerous persons? This too must be answered in the negative. If a cancerous subject suffers a wound or bruise the healing process takes place just as in a healthy person. The "plasma" forms good connective tissue in the one just as in the other.

4. Are there any special immunities or tendencies in cancerous individuals which would go to show a peculiarity of the "plasma" in them? Here we must stay before replying, to consider certain statements made especially by Rokitansky, which, if they were correct, would infer a peculiarity of the kind. He made a list of diseases which do not occur along with cancer; among these the most remarkable is tubercle.

It is in no disrespect for so great an authority that I venture to remark how much more reliance can be placed on his descriptions of the conditions he has seen, which descriptions are generally admirable, than upon the observations he makes concerning the associations of diseased conditions. Subsequent observers have quite negatived this proposition concerning the incompatibility of cancer with tubercle. There is no antagonism between them. I have seen one case where it was difficult to say whether a tuberculous phthisis or secondary cancer of the lung had had the largest share in causing death. Several other less striking but yet well-marked instances have come before me; so that I have no doubt that there is no such special immunity from tubercle on the part of cancerous individuals as Rokitansky supposed. The occurrence of the two diseases in the same

person is rendered improbable because cancer belongs to robust individuals late in life, and tubercle to specially delicate individuals earlier in life.

5. I have already at some length discussed that part of the basis of the hæmal theory of cancers which endeavours to place fevers and cancers on a common footing from their clinical characters. It was shown that cancers are remarkably unlike fevers in nearly all the characters specified.

From all this it follows that there is no evidence of any change in the blood proper to cancers; and this applies equally to innocent tumours. So that while we must admit that the blood may be altered in a manner that favours the local development of cancer, it is clear that even such an alteration has not been proved. The best evidence in favour of it is that from analogy with the circumstances that induce the development of some parasites through changes in the general health of their victims.

So far as we have any practical or real knowledge we may state the relations of the blood to cancers in this way. That the *nature of the substances in the blood may have some influence in predisposing to cancer, but there is no evidence that this is the case.* While, on the other hand, direct observation of the multiplication of parenchyma-cells to produce tumours, when taken with the history of the original development of the body in which the solids precede the fluids and develope the blood, shows conclusively that the vital cause of the growth of cancers and tumours has its seat and activity in the cells of the parenchyma and not in the blood. So that both parts of the fluidist pathology of tumours, that which regards the chemistry of the dissolved substances of the fluid, and that which supposes the origin of living forms from it, are without foundation.

Yet, although there is no proof that the blood of itself causes tumours in the texture, but rather there is evidence that it only furnishes pabulum for the new growths; nevertheless, there is important analogy for believing that some qualities of the pabulum may be *necessary* for, or favorable to, the production of tumours, however *insufficient* for their production without the origin of tumour-cells from the parenchyma of the part.

Continuing our inquiry, let us next ask what evidence have we that the solid elements of tissue act in producing tumour,

and what is the share they have in its production. I will not again go over the evidence, which proves that the cells of the parenchyma multiply in the growth of tumours, but will look rather to the more general considerations which go to show that alterations of the solids induce cancers and other tumours.

First, the effects of *age* show this. Age marks its effects in the solid parts of the body. Perhaps the very first sign of age in the organs of complete individual life, is the wearing of the arch of the aorta in the inner face of its convex part. This may generally be seen in children from the second year upwards. The elasticity of the arch is already proved not to be quite sufficient for the wear and tear it is subject to. There is no doubt it is the actual strain on the elements, that causes the states set down to age in the arteries, so that age is here another name for worn-out solid texture. The same may be said of other tissues. Take the interesting statements of Thiersch, who shows that in old people's lips, &c., the fibrous tissues waste, so that the glandular elements preponderate; but glandular tissue overgrown forms epithelial cancer, and it is an important suggestion that the wasting of the fibrous tissue, and relative overgrowth of the glands is a cause of the frequent occurrence of epithelial cancer in elderly persons.

On the other hand, there is no proof of such changes in the fluids in age. Hence, any diseases that belong specially to aged people, so far probably belong specially to changes in the solid tissues.

The effects of disease again indicate the same conclusion. Palpable local changes due to disease and severe injury show still more plainly than those due to age, that alteration in the solids is the cause of tumour. Thus, thrice I have seen epithelial cancers in the large intestine starting up in old dysenteric ulcers, the cancerous patch being circumscribed and occupying but a small portion of the great ulcer, while the other parts of the ulcer had all the characters of simple ulceration. The same is notoriously true of the scars of burns, which are not infrequently the seats of epithelial cancers.

The choice, on the part of tumours, of regions of the body exposed to mechanical wear or other cause of injury to the solid textures, is another proof that the solids are the proper agents in tumour growth. Thus, a large proportion of tumours of bone

in the lower extremity occur about the knee-joint, where throughout life mechanical shocks in jumping, &c., have been specially severe, the bones receiving here the whole jar of the vibrations on the small points in which their contact is close, in the casual position of the limb.

The same indication is given by the observation of Goddard, that the testis when retained in the inguinal canal, and so exposed more to injuries, is more liable to become the seat of tumours.

Also whatever shows cancer to be caused by a local extrinsic cause, so far proves its origin to belong to the solid texture. Thus the action of soot in producing chimney-sweep's cancer, the action of the tobacco-pipe in causing cancer of the lips and tongue in smokers, the irritation of warts inducing them to cancerous action.

So also the same conclusion is indicated by all the statistical evidence, which shows that the greater number of cancers in the alimentary canal and generative organs affect parts that are most exposed to injury by mechanical violence or contact with noxious ingesta or irritating secretions, *e. g.* the stomach and rectum in the alimentary canal, and the neck of the uterus.

The whole of these classes of facts, which agree in showing that tumours arise in parts which have suffered alteration of their solids through traceable local noxious influences, form a great mass of evidence to prove that the determining cause of cancer is local, and belongs to the solid tissues which suffer and retain the effects of mechanical injuries. For such local injurious conditions do not affect the blood or the general constitution in any way, and hence all these facts take away from any probability that the general constitution can determine cancer.

The same conclusion, namely, that tumours arise from causes affecting the solids and localised in them is favoured by any evidence of the hereditary descent of tumours in families. I am aware that this is generally regarded as pointing to the opposite conclusion, but I think its bearing is in favour of the local origin of tumours from the textures. The weight of this evidence is proportioned to the certainty that tumours are decidedly hereditary. There is much room to doubt whether they often

are so; but so far as there is any reason to believe in the hereditary descent of tumours, so far it is probable that they arise from local conditions.

It is true the word blood is used colloquially, as the practical equivalent for breed, yet surely this is by no means right. We find the breed from a particular stock showing itself in solid parts in a way that is not conceivably due to peculiarities of the fluids. Thus the stature of a man is commonly hereditary, but how can six feet high be in the blood? Or again a family nose: how can a family nose or lip be in the blood? Or those frequent cases of deformities of the fingers; these are strictly local, so that, if the deformed man loses his hand, he loses his deformity; and so far as tumours develop through a similar hereditary tendency, so far we should expect them to be strictly local, and to belong to the parenchyma; so that, when cut away, there would be an end of them, just as when one's hereditary index finger is cut off, one does not produce another; it was a strictly local parenchymatous development.

The supposition that a hereditary nature of tumours would show they belonged to the blood arose from the confusion of the blood with the constitution, which I have before endeavoured to clear up. Of course the blood is constitutional, just as the liver is constitutional; but the liver is local as well, and so may a tumour be *the most constitutional thing, but never at all the less local, innocent, and curable by removal.*

If the tissues were *mutual residues* from the blood, as the hæmal theory supposes, then, when one had had a tumour removed the tumour would be expected to start elsewhere; but this equally applies, whether it be a cartilaginous or a cancerous tumour. If I cut out a great enchondroma which arose as a residue of excess of cartilage deposited from the blood, then I should expect the excess of cartilage to show itself somewhere else, and so if I removed a great cancer I should expect it to reappear. But neither expectation is better founded at all than the one I might entertain if, having cut off a man's leg, I looked to see the surplus tissues which used to go out in the shape of the lost leg appear now in some other part.

But the tissues are *not mutual residues—they are mutual parasites.* In taking each its proper shape and size, they do not *separate* out of a fluid in which they were preformed; but

they *grow* as solids, and compete together for the fluid matters to appropriate them to themselves. It is not that the more of dissolved nose there is in the blood, the bigger a nose comes out on the face, but that the elements of the nose, in growth, if they be stronger growers than the rest, grow into a bigger nose at the risk of occasionally half-starving other features. The forming cause of the solids was never fluid in the blood, but rather the solids first formed themselves continuously from solids, and then gave rise, secondarily, to the blood as a means of conveying nourishment and stimuli to them, and interchanging the effects of one on the other. The solids still continue to yield living bodies to the blood, to course about in it as blood-cells, and these coming from the solids may, after their transit in the blood, be extravasated and grow to tumours in leukæmia; but this is in no way a primary action of the blood as a fluid; nay, it rather, as we have said, shows that the blood is not free from the pathological action of the parenchyma, which protrudes and discharges solid cellular growths, even into the blood.

Continuing our search of evidence that the solid parts locally produce tumours, we come on a very important proof of this in the likeness of each tumour to its *matrix,* or the part it arises in.

It could not long escape notice that tumours are apt to resemble the tissues they arise in; the instances of this rule are very numerous, and it applies, not only in individual cases of exact likeness of the tumour to its matrix, as when lipoma occurs in fat, osteoma in bone, &c., but it holds also when the resemblance is not so obvious, and there is only a more general similarity between the character of the tumour and that of the matrix. Dr. Wilks has indicated this clearly and rightly in pointing out that the harder tissues have the harder tumours, while the soft, juicy, vascular tissues have tumours of a like vascular and juicy nature.

On the hæmal theory this resemblance of the new growth to the tissue it occurs in, is set down as a result of some action of the nourishing power of the part which makes the "plasm" exuded from the blood take on the nature of the part into which it is "infiltrated."

This theory is very vague; it falls back on a sort of moulding power in the part which is ascribed to the already

existing texture, and from this already existing texture extends its influence into the new matters placed within its reach; but the arrangement of the powers supposed to be at work here is difficult to follow. The fluid and solids are supposed to be so related in the development of the tumour that the growing power belongs to the former and the forming power to the latter. This is a severance of growing power from forming power, which we have no warrant for assuming, because there is no other instance at all like it. Whatever has living form and takes up unformed nourishment is itself the seat and agent of the power of its growth, of which power its form is the embodiment.

But apart from the looseness of the theory there is a great class of well-established facts which are entirely fatal to it, namely, facts showing that a *likeness of the new growth to the part it forms in is found only in original growths.* Secondary growths have not a likeness to the part they form in, but rather a likeness to the part which the primary growth formed in. The secondary hepatic tumours of an adenoid carcinoma of the rectum are like rectum tissue, not liver tissue; the secondary malignant osteoma in lung is like bone, not lung tissue.

Now, why should this be if tumours were all caused alike by pouring out of cancerous "plasma" which takes the likeness of the part it forms in? Where is the moulding influence of the part in the secondary tumour? The secondary hepatic tumour should as much resemble liver as the primary tumour in the rectum resembles rectum tissue.

So that the explanation thus given by the hæmal theory does not serve its purpose, nay, fails where it is most wanted.

On the other hand, if we see these facts from the standpoint afforded by the belief that tumour grows from the parenchyma, starting originally from the solid texture, then the fact that the primary tumour wears the appearance of the texture it starts in, finds a safe place in the analogous history of breeding and generation, since the parent forms do but produce forms in their own likeness, the offspring retaining that likeness while they arise at an orderly rate, but losing it when they are formed hastily; and degenerating, but, nevertheless, so far as they have any defined likeness, having the likeness of the parent forms.

A strong support is thus given to the theory of local formation, even of the most malignant tumour. The likeness of the tumour to the part it grows in is a likeness of descendant to sire.

So also the fatal difficulty to the hæmal theory which we found in the resemblance of secondary to primary tumours becomes a great help to the view we are holding, for if the tumour is originally a growth of bone, and continues to have the nature of bone in itself locally, while it sends off germinal particles to impregnate distant regions, then it is to be expected that the secondary tumours which arise in other parts by such impregnation will put on the likeness which such germs from the original tumour bring with them. It will be as a colonisation of the organ invaded, by immigrants who bring with them the nature of the natives of their mother country, and cross with the natives in the part they enter, so that the offspring of bone will grow bony hybrids with the elements of lung. Here we have all analogy in our support, and, indeed, the entire accuracy of fitness of the theory for the facts is a great argument for the truth of the theory. If we see a tumour produced by the multiplication of bone elements put on the nature of bone, and that the secondary tumours elsewhere likewise have the nature of bone, this is altogether so like procreation and colonisation as we see it in animal life, that it is difficult to overlook the evidence so strong an analogy adduces.

We may say, then, that the resemblances which the new formations, show to the parts in which they arise, and the transference of the resemblance from the original to the secondary seats of tumour is another great argument for the belief that the local textural elements produce tumours by their own proper action.

Yet another evidence of the local origin of tumours lies in the differences they show in their elementary structure. Of course, it is possible that there may be as many dyscrasic or altered states of the "plasma" of blood as there are sorts of tumour texture, but yet, since we find that tumour textures vary almost *ad libitum,* it would be difficult to suppose that each of these variations is due to the presence of a distinct kind of blood disorder. Some of these differences have been explained

on the hæmal theory; they have been supposed to be *differences in degree* of malignant activity. Thus, Dr. Wilks, in a very excellent and simple view, which it is even unfortunate that one cannot support, places the following plan before his readers. He says the less malignant plasma fibrillates, while the more malignant plasma forms cells, a plasma of intermediate malignancy producing spindle-formed bodies, half fibre, half cell. Then, taking these forms as signs of three degrees of malignancy in lymph, he puts the following chart before us:

Character .	Ordinary structure	Uterus	Bone	
Innocent . .	Simple fibrous	Muscular	Exostosis	&c.
Semi-malignant	Fibro-plastic	—	Osteo-sarcoma	
Malignant .	Cancer	—	Osteoid cancer	

This is a simple, ingenious, and clear view; but its chief recommendation is done away when we have seen what has already been shown, namely, that the "plasma" in secondary growth does not take the likeness of the tissue in which it occurs.

And besides this objection, which altogether spoils the plan, there is another in this—that if we look at the degree and manner in which tumours show malignancy we observe that malignancy is not always the same sort of thing. Thus, in some tumours local return after removal, or recurrence, is the chief manifestation of evil nature; in others the lymphatic glands are constantly affected; yet others are very apt to attack the great viscera without affecting the glands at all. So much has this discrepancy in the malignancy of various tumours struck many observers that there have been several attempts to classify tumours according to the sort of manifestation their malignancy affects; and although no such classification has ever yet achieved much success, yet we have come to recognise the fact that malignancy is not the same thing in all tumours, but that the different tumours have their several varieties of evil disposition.

If, on the other hand, we view tumours as arising locally, through alteration of the elements of a part, we are prepared to

see an indefinite degree of difference in them—as great differences, indeed, between them as between the parts they arise in. If we leave go the "plasma," of which we have seen that we know nothing at all, and if we allow to the formative action of the part the same independence as we ascribe to it in its own original evolution, and consider growth as cell multiplication, then these facts, which are difficulties to any other view, fall in as strong aids to carry on the belief in the local nature of tumour growth.

To sum up all the classes of facts which I have enumerated in support of this view. We are prepared to believe that tumours arise locally from the parenchyma, because then we should expect to find these following conditions governing their appearance, such as actually we find to be the case, viz.—1. Tumours should be extremely various in their texture. 2. They should be more or less like the parts they arise in, according to their rapidity of growth. 3. Those tumours that are secondary and occur in the viscera should have the nature of the primary tumours. 4. The peculiarity of breed in the tissues should occasion more frequent occurrence of tumour in the same family, just as it causes in particular families supernumerary fingers and malformed toes. 5. External causes would induce the occurrence of tumour in the part they affect. 6. Alterations in tissue caused by disease would, under some conditions, lead to tumour in the part altered. 7. The effects of age in causing wear of the solid textures should predispose these textures to take on new forms of activity.

This view of the origin of tumours, which regards them as due to the action of the solid elements of the part affected, is surely that which best accords with what we know of their history. There is nothing but the vaguest and most shadowy matter against it, while the evidence in its favour is of much weight.

We must again observe that *this view does not deny the constitutional nature of tumours; it puts their constitutional value in a clear light.* They are as constitutional as the hand, and as local; like the hand, if removed, they need not come again for all that they are constitutional. When removable they should be removed as early as possible, and as widely as is consistent with other necessary considerations.

Every tumour may have some extrinsic factor; but whether it has an extrinsic factor or not it has always an intrinsic factor in the disposition of the tissues of the part it forms in; without such disposition no tumour formation would occur. The inconstancy of the result of all known external causes of tumour compels us to regard the intrinsic factor as the chief factor—in other words, to regard the disease as constitutional. If every inveterate smoker became subject to a cancer of the lip then we should set down cancer of the lip to smoking as certainly as we set down a blister to cantharides plaster, and we should say little about the constitution of the sufferer. Of course, even then *it would be equally constitutional,* though it would not indicate a *peculiarity* of constitution.

But this is not so; there is no cause which will with certainty produce a tumour in like manner as cantharides will constantly produce a blister; hence we are obliged to regard the formation of a tumour as indicating the existence of an intrinsic peculiarity in the individual. Yet what I wish to have specially clearly recognised is this, that such a constitutional peculiarity is by no means a thing to be regarded as general to the whole individual, for all evidence goes to show that it belongs only to the part it occurs in. And even if that is not so, and if all the textures of a man who has an epithelial cancer on his lip through long friction with a tobacco pipe would have been equally liable to suffer the cancer from equal friction, that is no reason why the part which has suffered the adequate external irritation, and is actually diseased, should not be removed, in the hope that the unirritated tissues may still retain their *freedom* from cancer in spite of their *liability* to it.

No explanation can be given of the fact that one man's lip should grow a great mass of semiglandular tissue while another does not do so under the same external irritation; we cannot tell why this should be, any more than why one man's lip should grow into one form and another man's into another. There are physiological as well as anatomical differences of constitution. But it is something to see that the diseased growth is a fact of the same general nature as healthy growth. In this light we find such disease to *analyse the ovum further,* if I may so speak, and to show us that all that which the germ power does in the normal development is not all that it can

do. But residues of formative power remain, and may in fit circumstances come into play at a later time. And this residue of formative power, which thus develops the ovum more completely, may lead to the production of complex and elaborate structures, such as those congenital sacral tumours which may contain all the normal tissues,—I have found well-formed grey matter of brain in one. Or the piliferous cysts which may be met with in almost any part of the body, and may contain skin, bone, cartilage, teeth, &c. On the theory of local development these are analogous to supernumerary fingers, but on the hæmal theory there is no suggestion of an explanation of them.

This continuity of tumours with normal local development is strongly in accordance with a grand truth, which, as I have before said, we are in danger of losing sight of, namely, that tumours show physiological properties corresponding to their anatomical construction. It will be a great misfortune if the full force of this truth is not developed. Tumours that resemble physiological tissues behave like the tissues they resemble. Fat in tumours behaves like fat in the healthy textures; it may grow, but it has no infectious properties. So also cartilage, so far as it is cartilage, may grow, but never infects; only when it is not cartilage, but something which is so like cartilage that it is convenient to class it structurally with cartilage, then it possesses new properties along with its new structure. When we talk of "malignant enchondroma" we are not really treating of tumours of cartilage at all, at least so far as my experience goes, for I never saw a cartilaginous tumour of a dangerous kind that was like physiological cartilage in its structure; rather it had a structure of a peculiar kind; it was not wholly unlike cartilage, but its cells threw out processes and joined their neighbours to form a cell texture, and in parts formed the so-called mucous tissue. I believe, if we subscribe too readily to Virchow's teaching, *that every tumour-tissue has its physiological type*, we may altogether miss, nay, lose sight of, the mark to be aimed at. The statement is, in the first place, not true to fact. With all the unparalleled ability and laborious research which its illustrious author has used in framing and supporting this teaching—and no one could hold his labours and their results in higher esteem than I do—it nevertheless remains true that

tumour-tissues are not like normal tissues. This is more true than that they are like normal tissues. We must, of course, remark that such words as "are like" or "are on the type of" are very vague. Planets are like stars. All birds are like each other. A whale is like a fish. To see likeness is important, but not so important as to see difference.

And if we regard, not the likeness of tumours to their types, but their differences from them, we must be struck with the fact that tumour tissues are never like the physiological tissues unless they be entirely innocent. Osteoid cancer is not bone; its skeleton may be a good deal like bone, but in all the specimens I have examined the fresh tumour of osteoid cancer was altogether unlike bone, although a peculiar process of ossification was taking place in it. And so enchondroma is never like cartilage unless it be a most innocent thing, which will do what physiological cartilage will do, that is, grow and nothing more; and even then, if you follow the observation through in complete fairness, and look especially at the growing margin of the tumour, you will always see that the growing edge of the cartilage of a cartilage tumour is not quite like the growing edge of physiological cartilage. *There is no difference of the physiology of tumour-tissues from that of normal tissues which is not expressed equally in the anatomy of the tumour-tissue by a difference of it from the anatomy of the normal tissue.*

And it is a dangerous error to say that some tumours, which are *quite* like normal tissue, behave malignantly because they are out of place, or though "heterotopia." To say this is to throw away the greatest of all vital truths, which is that the form is as the action, and the action as the form. This truth is never gainsayed either in morbid or in healthy physiology. And I would even say that there is no tumour at all which is quite homologous; every tumour-tissue has some peculiarity. And *cæteris paribus* the malignancy of a tumour or its unusual behaviour will be marked in proportion to the unusual nature of its structure. No tumour is entirely homologous, but some are practically homologous. Homology is comparative.

The truest bony tumour is only true bone in its complete form, when it is no longer growing. When you examine the growing edge of a bony tumour you will find that its elements show peculiarities.

Hence, while it is a great advance in the *classification* of tumours to ally them, as Virchow has last and most completely done, with the different textures, I believe that, for the purpose of stating their nature, alliance with normal tissues is a step backwards. And while using the classification Virchow has given us, it is the best service the pathologist can render to the life-history of tumours to point out in each tumour what is its anatomical peculiarity that corresponds to the peculiarities of its course and properties as compared with normal tissues, and I believe that when any tumour has shown active and dangerous powers its structure is always unlike any tissue of the body whatever. Indeed, no substance in the body is at all like carcinoma.

We would lay down this, then, as the law of relation of tumour-anatomy to tumour-physiology—that in proportion as a tumour has a peculiar structure and a great activity of growth, in such proportion has it a tendency to repeat itself in remote parts or to prove malignant. Sometimes the peculiarity of structure can be plainly seen to favour infection. Some actively growing tumours show little disposition to invade the glands; this is especially the case with medullary sarcoma and myxoma. But the anatomical structure of other tumours, such as carcinomata, which do early affect the glands, sufficiently explains their ready implication of the lymphatic system. I will refer here to Mr. Henry Arnott's excellent paper in the 'St. Thomas's Hospital Reports,' 1872, where he shows very clearly the advantages in spreading themselves which carcinomas possess in their setting free young small growing cells within the lymph spaces. Such peculiarities in the tissue of a tumour will naturally favour or disfavour its spread in particular directions. And, indeed, the rule that connects a peculiar activity in a tumour with peculiarity of structure will always hold true.

Mr. Arnott also in his paper makes some valuable remarks on the nature of malignancy and cancer, and adopts the view that cancer is any malignant tumour. This is not quite a question of words. Cancer is a name which we have received by tradition and have been taught with, and it is no matter of indifference what we may choose to call by it now. When we say that any malignant tumour, whatever its structure, is a cancer, and refuse to limit the name cancer to carcinoma as now defined, this is

what we mean—that when you are reading any older authors as to cancer you must not be induced to suppose they meant only our carcinoma, but rather they meant any tumour that had malignant ways. The meaning we give to the word cancer affects the continuity of medical thought on tumours very seriously; it is better to keep the word cancer to its old use and meaning, and then we are at one with the older authors in our meaning of the word, and can more readily profit by their remarks.

I believe it is most correct and convenient to use the word cancer to signify any malignant tumour. It may be well to consider for a few moments what we mean by malignant, as the word is sometimes very vaguely used.

One rather usual employment of the word malignant when applied to tumours is as an equivalent for noxious or mortal. Tumours that kill are not easily called benignant or innocent, and these words are the proper opposites of malignant. Tumours are apt to be called malignant if they be fatal, or one cares not to call them by any milder name. Yet many fatal tumours of the stomach or brain, &c., are not malignant in any other sense than that of being mortal.

Malignancy in tumours is—1. The power of infecting tissues around, so that the tumour spreads, by contiguity, into kinds of texture different from that in which it arose, and so that it returns after removal. 2. The power of infecting the lymphatic system so as to cause swelling of the lymph-glands, corresponding to the affected part. And 3. The power of infecting the blood-stream, so that its germs are carried to remote parts, there to set up tumours of like nature. These qualities all sum up under the term infectiousness. A malignant tumour is a tumour that is infectious to the other tissues of the individual. Such tumours often grow rapidly and ulcerate, and then show little tendency to heal. But this is not the case with them all, so that it is better to regard these latter characters as characters of some forms of malignant tumours, especially the encephaloid kinds, and to limit the signification of the word malignant to infectiousness, as shown in the four ways above mentioned.

Such malignancy is not peculiar to tumours; it may belong to wounds and sores, and so create pyæmia, which is malignancy

of wounds and sores, and it belongs generally to tubercles and to the suppurations of farcy, to malignant carbuncle, &c.

Summary of the theory of tumours.—In the present state of our knowledge of tumours, both benignant and malignant, it is necessary to regard the hæmal processes as subordinate to the parenchymatous processes in their production.

The blood furnishes a plasma to the tumour, and very likely favours the development of the tumour much in the same way as starvation in a plant favours the development of the aphis. Such favouring tendency in the blood may be necessary, but is not sufficient to form a tumour.

The power of the blood-cells to form tumours in leukæmia, &c., if proved, is only a means of secondary causation, because the blood-cells themselves are derived from the solid textures There is no reason to believe that the "plasma" furnished by the blood can produce cells.

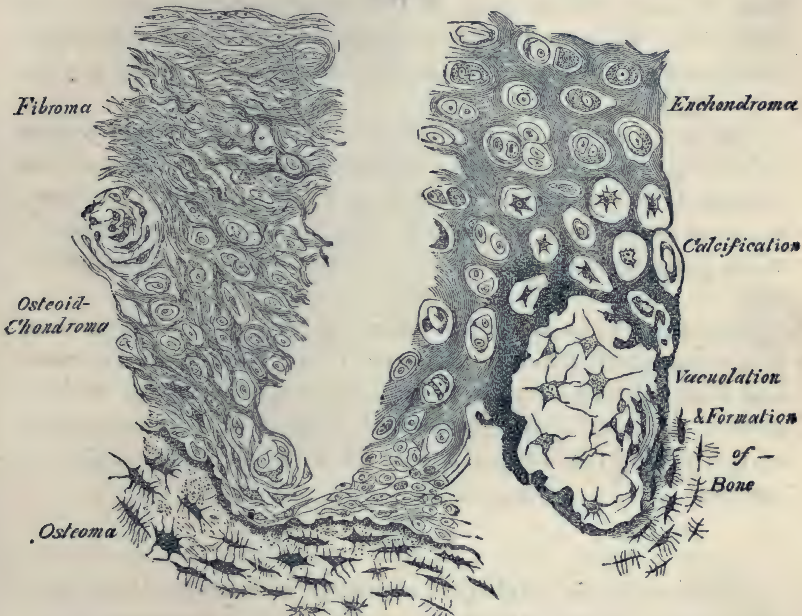
The individual cell-elements of tumours arise by multiplication of the cell-elements of the parenchyma. This multiplication of the parenchyma-cells is always constitutional, although it be localised in the part, and although it may require prolonged irritation to elicit its activity. There is also a "higher" controlling influence to be recognised in the formation of tumours—an influence equal to that which governs the organization of the several organs of the normal anatomy. This organizing influence determines the elementary cells into various plans according to the nature of the tumour.

The following figures and descriptions are intended to furnish a condensed summary of the chief features of the several kinds of tumour now recognised. No drawing is given of melanotic tumours. The pigment in melanotic tumours is found to ally itself with many varieties of sarcomatous and carcinomatous growth, being contained in the cells of those growths, which otherwise do not show any peculiarities.

Osteoma, Osteoid Chondroma, Enchondroma.

When bone forms a large part or apparently the whole of a

FIG. 1.



tumour, the tumour is called an osteoma; but no tumour is ever formed altogether of bone; there is always present an ossifying matrix, by the ossification of which the bony part of the growth enlarges. The kind of matrix varies much; thus, sarcomata or even carcinomata may directly ossify, and so we get *osteo-sarcoma* and *osteo-carcinoma;* but the forms of matrix which produce growths of practically a bony nature are generally two, viz. periosteum and cartilage. Periosteum, or, to speak more exactly, a tissue resembling closely the deeper layer of the periosteum, forms large tumours, whose transformation into bone takes place in the manner shown in the left side of the above figure; the cells take the shape of bone-cells and the matrix calcifies; these tumours are called *osteoid chondroma* or *periosteoma.*

Cartilage often appears to be ossified when it is only petrified by deposit of calcareous salts in its matrix (see right side of Fig. 1); this change is, as is well known, the first step in

ossification of cartilage. In many cartilage tumours the process goes no further, or it may proceed through the several stages shown in the right side of the figure, viz. vacuolation, formation of medulla-cells in the vacuoles, and direct transformation of these to bone-cells, as seen in the lower and right part of the drawing. More rarely the cartilage-cells, without calcifying, proliferate and change directly into bone, as seen in the middle of the figure.

The amount of cartilage, periosteum, or bone present varies indefinitely in different cases. When cartilage preponderates the tumour is called an *enchondroma;* when bone preponderates, an *exostosis, osteoma,* &c., according to its shape and connections; when periosteum preponderates, an *osteoid chondroma,* as before said.

Occasionally the amount of bone and cartilage is so equal that it is a matter of difficulty to decide which name shall be used; and then the terms *cartilaginous exostosis,* or *ossifying enchondroma,* are employed. *Osteoid chondroma* is to be suspected of malignancy; it makes a part of what were called *osteoid cancers.*

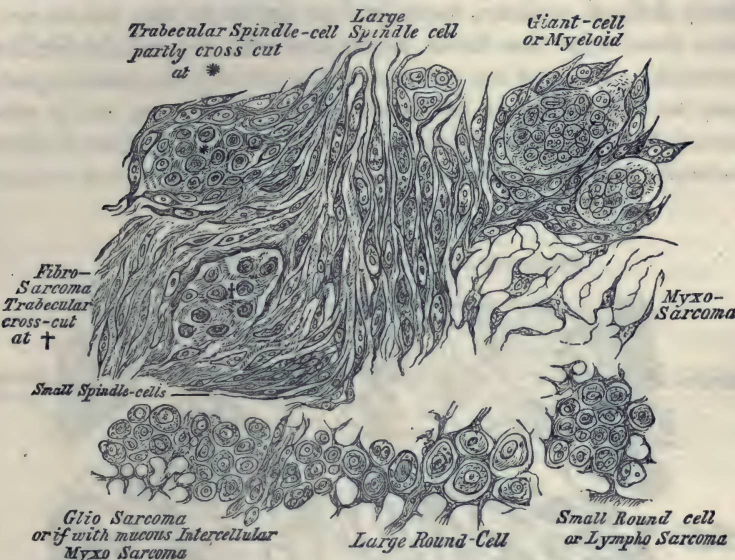
Sarcoma.

The distinctive histological character of *sarcoma* is the possession of a stroma between the cells, an atmosphere of intermediate matter which surrounds each, and is between them all. The qualities of this intermediate or "intercellular" matter determine the kind of sarcoma.

The relation of sarcoma to the connective class of tissues appears to be this, that when one of these tissues is produced very rapidly it has no time for its intercellular matter to acquire the proper characters of its normal structure, and hence it remains indeterminate, while it also is small in quantity, the cells greatly preponderating. Thus, any of the normal connective tissues may produce by rapid development a tumour of sarcous tissue or sarcoma (the name is well chosen, σαρξ, which equals *caro,* or our word *flesh,* means commonly any soft animal substance, not blood nor bone). It follows that there are several kinds of sarcoma, according to the tissue of which each is a development. The principal of these are seen in the schematic figure on next page. The round-celled kinds generally arise from lymph-gland, or neu-

roglia, or mucous tissue; hence they are common in myxo- or glio- or lympho-sarcoma. The spindle-celled kinds arise from

FIG. 2.



connective, fibrous, or bony tissue, and hence they are common in fibro-sarcoma or osteo-sarcoma.

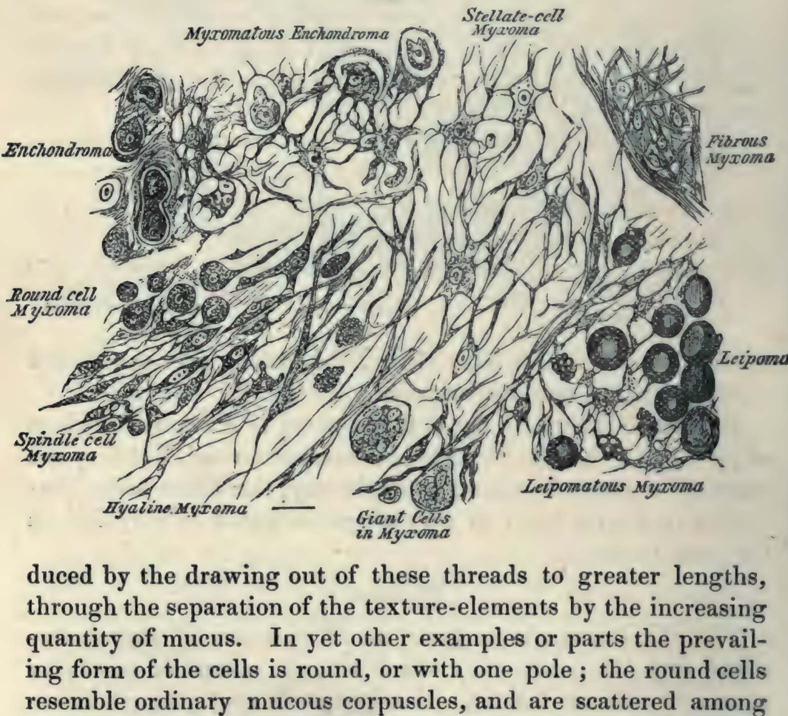
The above schematic figure is composed of accurate drawings of portions of the several kinds of sarcoma named, but they are gathered together in a diagrammatic way, the forms being graduated into each other as they are when found side by side in the same tumour.

Myxoma.

The name myxoma is given to all tumours of connective-tissue type (not epithelial) which contain mucus or mucin in their intercellular matter. It corresponds nearly to gelatinous sarcoma, collonema, and fibro-cellular tumour of older authors. The forms of the cells are very variable, but in the most typical examples, and especially in the older and fully developed parts, the cells are large and usually multipolar or "stellate," with a distinct nucleus and nucleolus; the stellate branching rays of the cells are mutually connected, so as to form a more or less open network, in the interstices of which the mucous semifluid

lodges. Beams and bands, which generally have a stiff rigid appearance and an angular rather than a wavy disposition, pass about, dividing up the substance of the tumour into very imperfectly defined sections, more or less visible to the naked eye; from these arise fine fibrils continuous with the cellulo-fibrillar network. Much of the tumour, and especially the younger part, may be found formed of spindle-cells. These are really connected, by threads from their sides, with the intermediate fibrillar network, and it can often be seen that the stellate forms are pro-

Fig. 3.



duced by the drawing out of these threads to greater lengths, through the separation of the texture-elements by the increasing quantity of mucus. In yet other examples or parts the prevailing form of the cells is round, or with one pole; the round cells resemble ordinary mucous corpuscles, and are scattered among the fibrils in the mucoid matter; they often contain many fat-grains, and are found in the oldest parts of the tumour, representing the senescence of its cells. There is also a great variability of the intercellular substance, first, in the proportion of the fibrous to the cellular part, and, second, in the proportion which these solid elements bear to the mucoid interstitial matter; thus, there is fibrous myxoma and a clear pellucid variety, with much

mucous fluid, perhaps even forming cysts (hyaline and cystic myxoma). In some examples there are large polynucleated cells, identical with the so-called giant cells of "giant-cell" sarcoma.

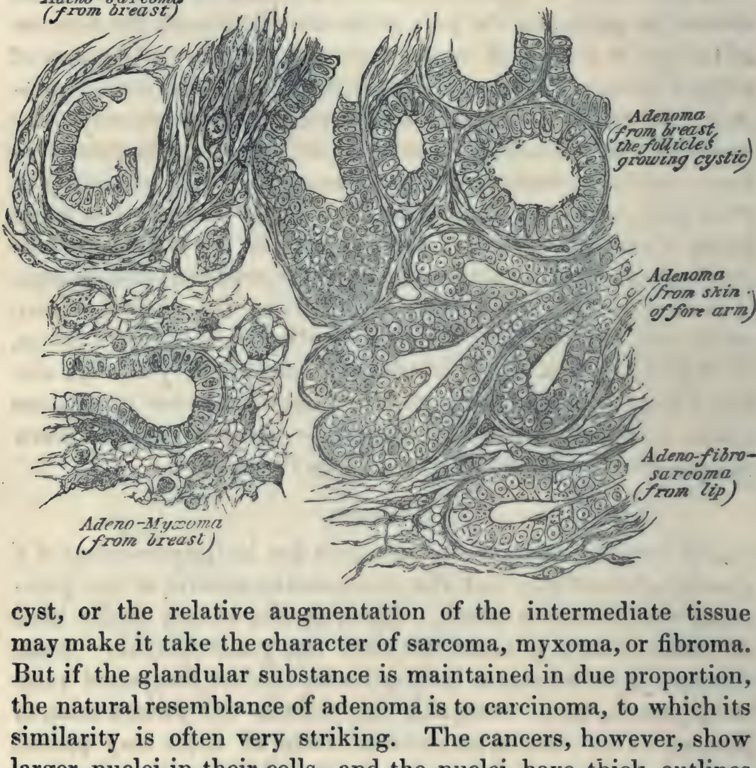
In the theory of types, myxoma is affiliated to certain natural tissues, in particular the jelly of the umbilical cord, the vitreous of the eye at a stage of its development, and the early stages of adipose tissue, as well as a stage of bone formation out of cartilage. It will be seen that these typical tissues are only transitory in their nature, as compared with such stable tissues as bone, cartilage, tendon. In accordance with this instability of their type, myxomas themselves show many transitions to many kinds of connective tissue; these transitions are chiefly towards cartilage or fat (myxomatous enchondroma, myxomatous leipoma). Tumours are not infrequent, especially in the parotid region, which are intermediate between cartilage and mucous tissue, so that one cannot say to which they most properly belong; also many fatty tumours show clear gelatinous patches of mucous tissue in all transitions to fat, while many myxomata show opaque spots composed of true adipose tissue.

Adenoma.

The essential character of adenoma lies in the possession of a glandular structure; but the comparative amount of the glandular element varies much. There is also variety in the kind of tissue which is found between the gland-follicles. Some tumours show structure identical with that of compound racemose glands, more commonly the follicles are dilated more or less, so as to form cysts; one or more of these may prevail so as to give a cystic character to the whole (cystic adenoma). Besides the cysts arising in this way, others may be formed by a breaking down of the intermediate tissue, especially if it happen to be mucous tissue. More frequently the glandular elements are surrounded and separated by a new formation, which may be so much developed as to more or less entirely take away the glandular character of the growth; this interstitial tissue may either be fibrous, sarcous, or mucous, or more rarely cartilaginous or areolar; or it may present characters combining these or mediate between them (*adeno-fibroma, — sarcoma,—myxoma*). When the proportion of gland is small, there is doubt whether it is not part of the original gland-tissue persisting in the new

substance. Thus, the relative augmentation of the cavities of ducts or follicles may make the tumour take the character of

FIG. 4.



cyst, or the relative augmentation of the intermediate tissue may make it take the character of sarcoma, myxoma, or fibroma. But if the glandular substance is maintained in due proportion, the natural resemblance of adenoma is to carcinoma, to which its similarity is often very striking. The cancers, however, show larger nuclei in their cells, and the nuclei have thick outlines and contain many nucleoli; the cells are of more varied forms, and make usually compact columns and bulbs rather than follicular cavities.

Carcinoma.

The term carcinoma is now distinctively applied to such tumours as have a structure of the following description, viz.— A meshwork of fibrous or sarcous substance rich in nuclei, composing an areolar structure, whose interstices are filled with cells. These may have no orderly or methodical-looking arrangement, being packed in the crevices in the meshwork (or alveoli, as they are called), and extending casually from alveolus

to alveolus, so as to make a complementary meshwork. The carcinomatous character is determined by the presence of such

FIG. 5.

alveolar structure, with cell-collections lodged in it; the decisive

point consists in these cells lying close together without any intercellular substance; the cells generally vary in shape, and have large nuclei, with large and bright nucleoli. But often the cells have an arrangement very like the epithelial lining of the follicles of the secreting glands, a structure which may be so well pronounced as to bring them almost into continuity with adenomas. They differ from these chiefly in their history, as being infectious, so as to extend into the neighbouring tissues, to the glands, or to the viscera. The structure of carcinoma as compared with adenoma shows, perhaps, only this peculiarity, that its stroma is charged with cells.

Five leading types of carcinoma may at present be conveniently distinguished.

1st. Those in which the fibrous meshwork is in preponderance, and the epithelioid contents of the alveoli are scanty, and, perhaps, also prone to perish early, so that they are found more or less degenerate within the fibrous meshes—Hard Carcinoma, or Scirrhus.

2nd. Those in which the fibrous meshwork is in smaller proportion, and the epithelial contents are plentiful, making large collections of cells, but with no evident approach in the form of these collections to the shapes of gland-acini, and no evident resemblance of the component cells, either to the columnar epithelium of mucous glands, or the squamous epithelium of cuticle—Soft Carcinoma. This kind occurs especially in glands, and the transformation of the glandular tubes or follicles to cancer alveoli can be seen in all stages in the growing margin of the tumour (see the upper two drawings in Fig. 5, from the liver and kidney).

3rd. A structure essentially such as that last described, but with this difference, that the epithelioid cells have a quantity of mucus between them, which is regarded as arising from a transformation of them. This change of mucus may be carried to such an extreme that scarcely any cellular elements are left, while the alveolar meshes in which the mucus is contained become very strikingly visible from its nakedness and the pellucidity of the mucus — Colloid, or Alveolar Cancer. A common seat of this is the wall of the alimentary canal, where it may be traced arising from Lieberkühn's follicles.

4th. A structure in which the epithelial cells resemble squa-

mous epithelium, and form masses which are very like the follicles of cutaneous glands, or occasionally like rudimentary hairs; the tubular and bulbous forms may, however, be seen ramifying like the lymphatic vessels of the skin, as if their form were moulded to the lymphatic plexus. In these cancers peculiar bodies are found, composed of flattened cells disposed concentrically so as to form a scaly-walled globe, whose appearance is like the section of an onion, or like a bird's nest; these are so large as often to be visible to the naked eye; when they are numerous and well characterised, they are diagnostic; some authors (Billroth) distinguish a variety of this cancer in which the stroma preponderates over the epithelial part, calling it scirrhus of the skin—Squamous Epithelial Carcinoma.

5th. A structure in which the epithelial cells resemble ordinary columnar epithelium, and the structure itself is quite like normal mucous membrane, in which it always primarily arises (alimentary canal, especially colon, uterus); the secondary formations which occasionally occur in these cases, in the liver especially, have the same structure, and thus a tissue like the glandular mucous membrane of the colon may be found in the liver—Cylindrical Epithelial Carcinoma.

The fourth and fifth varieties are distinguished from the three first as epithelial cancers or epitheliomata. Some authors have used the term cancroid for the fourth variety, as though it were not completely cancerous. These are less likely to infect the viscera than the first two varieties, which are the most infectious of all tumours, though they are very far from being the only kinds of infectious tumours.

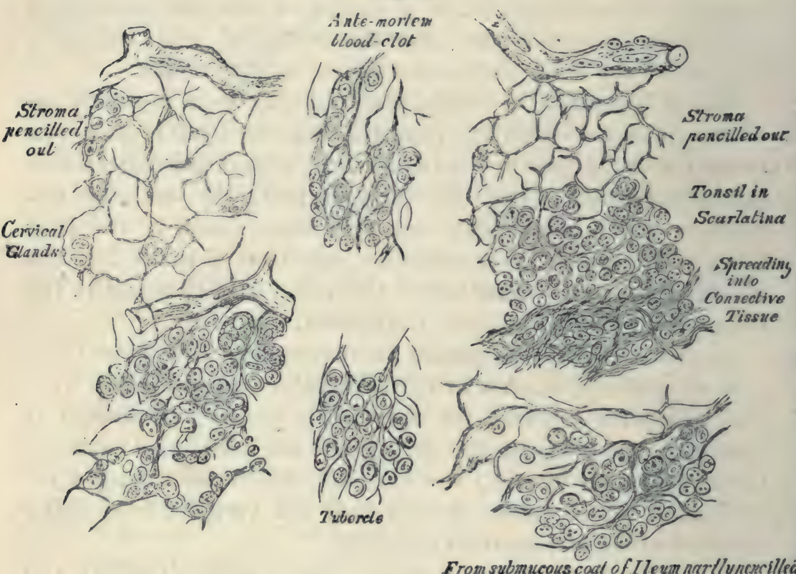
When the first or second variety shows pigment within the cells, it is called melano-carcinoma. Other melanotic cancers consist of sarcoma with pigment in its cells; these are called melano-sarcoma.

Lymphoma.

The name lymphoma is given to such growths as have a microscopic structure like that of lymphatic glands; in particular, which have a finely reticular meshwork, connected with which are some fixed cells at tolerably regular intervals, not unlike the fixed cells of connective tissue, but generally larger. Within the meshes of this network are numerous cells, which

resemble lymph-cells, and hence are also like pus-cells and white blood-cells. The proportion of network to the contained lymphoid cells is variable; sometimes the quantity of fibre is great, and the structure is then like lymph-gland tissue hardened by chronic inflammation. In other cases the proportion of cells becomes very large, while the network grows very delicate and open textured. The fixed stellate cells here appear to multiply, and produce a progeny of the loose movable cells in the meshwork, as if infected by the latter. The whole mass

FIG. 6.



then appears as fine filaments making bold meshes, which are filled with round granular cells, the lymph-cells, but generally larger, and having large nucleus and many bright nucleoli. These cells at first appear to make up the whole substance, but they easily brush or wash out of the meshes, leaving the network very conspicuous. It will be noticed that the degree of structure here described is very rudimentary. Indeed, sections of *ante-mortem* blood-clot from within a vein (see figure) closely correspond to the description. So also does tubercle in the more recently formed outer edge of it, where its texture is very like blood-clot; hence it is by some classed with lymphoma.

Scarlatinous tonsils and typhoid Peyer's patches likewise have lymphoma structure. However, the plan of structure is so meagre that it is not enough to form a bond of union between diseases clinically so remote.

When found in the form of tumours, more properly so called, lymphoma generally takes its rise in the lymphatic glands; those of the neck are especially liable to it, then those of the abdomen and of the mediastinum. It is also found in the alimentary canal, especially the small intestine and stomach, and in the spleen, liver, kidney, &c. Formations of a similar structure have been met with in various organs in leukæmia, chiefly in the liver, in the form of small grains of a pale substance.

Lymphoma may prove malignant, that is, infectious to parts around, especially when the cellular elements are very numerous (in which case the tumour is called lymphosarcoma by Virchow); it then corresponds to a part of what used to be included under the whole name medullary cancer, which, as formerly used, would include also soft sarcoma and soft carcinoma. Indeed, these tumours, when the cell-elements greatly preponderate, become very like each other, if not undistinguishable, as far as their mere structure is concerned.

A CASE OF

INFLAMMATION OF THE AORTA,

CAUSING

CONTRACTION OF ITS ASCENDING PART AND FATAL ISCHÆMIA.

By WALTER MOXON, M.D.

My object in recording this case is to draw attention to the remarkable kind of inflammatory disease which affected the aorta.

The accompanying plate, together with the following few particulars, will, I hope, prove of interest to those who have given attention to the inflammatory diseases of the blood-vessels. The case was that of a man aged 41, who died in the hospital, June 6th, 1871, of cardiac disease, which had the special characters of aortic obstruction. It will not be necessary to detail the appearances of the body as found at the *post-mortem* examination. They were those usual in this class of cases; the hypertrophy of the heart was very great.

The state of the aorta is the point of interest; its ascending part, including its orifice of origin, was contracted very remarkably. Yet the general condition of the remainder of the vessel was unusually good, except that there were two other patches of sharply circumscribed disease, corresponding exactly in their appearance with the one at the origin of the vessel, which latter I will more particularly describe. Of the other

patches one was in the commencement of the descending part of the aorta, and the other was near the cœliac axis.

The inner surface of the diseased patch, when the vessel was slit up and spread open, had the appearance of a circumscribed eruption; the edge of it was in boldly advancing convexities. The surface itself was raised in folds and wrinkles, and had a bluish-white colour and semipellucid appearance, instead of the natural colour of yellow elastic tissue; the substance felt flabby and inelastic. These characters so far resembled those usual in endarteritis. The thickness of the diseased part was considerably increased, so that it was five times that of the healthy portions of the vessel, but not uniformly so.

It was difficult to separate the affected portions of the aorta from parts around, while the rest of the aorta came away very readily and cleanly from the surrounding substances. The exterior of the diseased parts of the aorta had a very curious appearance, closely resembling that of coarse orange peel, except for their white colour. A thick fibrous felt formed the outer layer of the diseased vessel. It was inseparable from the coats beneath it. In this fibrous felt there were numerous regularly set small spots of a yellowish colour, at about $\frac{1}{12}$ inch distance apart. When kept in spirit these spots formed little pits, through their substance shrinking more than the fibrous tissue around them. They were in the *tunica adventitia;* the other coats having, as already described, the usual characters of subacute "endarteritis deformans."

Microscopic examination showed each yellow spot in the felt-like adventitia to be composed of a vast quantity of minute cells forming a body in which the fibres of the felt-work were more or less decaying. The intermediate parts of the felt contained some similar corpuscles, but in much smaller numbers. The corpuscles were the smallest inflammatory corpuscles I have ever seen. Their average size was $\frac{1}{5000}$ inch (the preparation had been kept in spirit and water, and this may have reduced the size of the corpuscles, but similarly kept preparations do not show a like diminution of the cells), the beds of corpuscles dipped from without inwards into the proper coats, diminishing as they went in this direction, until you found only little clusters of cells between the inner elastic

laminæ of the vessel's wall. These cells had the same peculiar smallness as those in the adventitia. They were frail, and had broken down, along with the fibrous tissue in the yellow spots, so that microscopically a close approach to tubercle was made by these spots.

The characters of this disease, especially the smallness of the cells (which I think cannot be set down to the influence of preserving fluid), their limitation to the aorta coats, and the very curious dotted distribution of the little foci of which the disease was made up, indicate a proper disease of the vessel's wall rather than an accidental determination of ordinary inflammation. No doubt can exist of the acuteness and activity of the disease here shown. If seen only from the inner surface, however, it would easily have passed under the rough term "atheroma," as still commonly used, and so have borne the characters of a mere degeneration. The existence of such inflammatory diseases of the coats of the vessels is a very important truth. They occur in young people as acute and subacute fatal diseases.

In the 'Guy's Hospital Reports' for 1861 I put together some facts which go to show that the ordinary inflammations of the coats of the great vessels arise chiefly through the mechanical strain they are subjected to in laborious occupations, or in cases of special tension in the arteries of some viscera, through their pathological accidents. The case before us, however, will not bear such an interpretation. The curiously circumscribed patches of disease were unmistakably eruptive in the same sense as that in which we speak of cutaneous eruptions. The disorder was spreading with convex edges just like a patch of lupus, and we must look on the case as due to a constitutional action of the part, however excited.

From this and other cases which I have met I am emboldened to express my belief that the coats of the arteries are liable to inflammatory eruptions as the skin to its eruptive inflammations.

Unfortunately the process is not attended with pyrexia or other warning of its grave and menacing dangers; but it progresses until an aneurysm is formed, or the vessel bursts without aneurysm forming, or through near neighbourhood to the aortic valves the functions of these are fatally disturbed, or

else, as in the present case, the coats of the aorta undergo thickening and scarring until the calibre is consequently fatally narrowed. In some cases there has been reason to suspect that syphilis had been a cause of the disorder, but farther observations are required to show the pathogenetic associations of this truly terrible kind of disease.

DESCRIPTION OF PLATE

Illustrating Dr. Moxon's Paper on a Case of Inflammation of the Aorta, causing Contraction of its Ascending Part and Fatal Ischæmia.

Fig. 1.—Section of the adventitious coat of the aorta parallel to the surface of the vessel, seen by transmitted light with a low power ($1\frac{1}{2}$ inch). In the fibrous tissue are regularly placed dark patches, which are collections of minute cells (see fig. 2). These spots appeared yellowish by reflected light, but are dark by transmitted light, through the refractile nature of the cells.

Fig. 2.—A small portion of fig. 1 examined by a higher power ($\frac{1}{5}$ inch), showing a quantity of remarkably small cells, averaging $\frac{1}{5000}$ inch, much smaller than red blood-cells. These are in the fibrous tissue, and mostly between its bundles; a few, however, are certainly within the bundles, as though from multiplication of the connective corpuscles. In the foci of the yellow spots (in the right side of fig. 2) the fibre bundles lose their structure and appear as light spaces, while the corpuscles disintegrate.

Fig. 3.—Section through the coats of the vessel at right angles to their plane, seen by a low power ($1\frac{1}{2}$ inch), showing the *adventitia* (*a*), and the proper coats (*b*). The outer part of the latter is seen black from degeneration of fatty kind. Opposite (*c*) is a broken-looking spot. This is seen more highly magnified in fig. 4. The dark patch in the adventitia is a transverse section of one of the dark patches in fig. 1.

Fig. 4, in the lower end of which is the part corresponding to the broken spot. It is composed of the same minute cells as are in the *adventitia* (fig. 2). In the middle of the figure these are seen arising from the proper cells of the coat by multiplication. At the upper end in this drawing there is a portion changed in a way that is often found in bad arteries; it resembles cartilage, both to the naked eye and, to some extent at least, in its microscopic characters.

Fig. 2

Fig. 4.

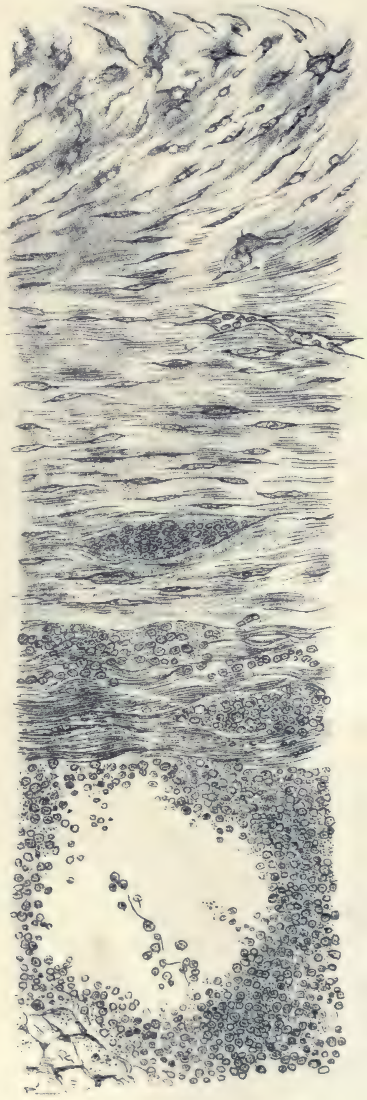
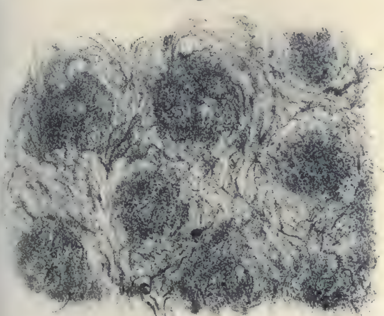


Fig 3.

Fig. 1.



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ON HOSPITAL DIETARIES.

By J. C. STEELE, M.D.

The means used for dieting the sick in hospital, and the expenditure consequent thereon, are subjects well worthy of the attention of those interested in hospital matters; and an analysis of the methods employed in Guy's and other establishments of a kindred character to meet the daily alimentary requirements of the sick is not irrelevant to the object and purposes of these Reports. The increased cost of provisions, the altered aspects of medical practice, and a change whether for better or worse in the social habits of civilised life, have each contributed to augment the expenditure for food in all public establishments. The question of food supply is consequently one requiring much serious consideration on the part of those to whom the administrative arrangements of hospitals are entrusted, with a view to combine what is best adapted to the wants of the sick with sound economy and efficiency of management. Notwithstanding the attention evidently paid to the subject by various Hospital Committees and other responsible authorities, it will be found on inquiry that little uniformity exists in the methods employed to meet these separate requirements. This, no doubt, depends on the essentially independent character of the establishments supported by voluntary charity, and is in marked contrast with the mode of management pursued in prisons, military hospitals, workhouses and lunatic asylums, which are all more or less under government or municipal surveillance.

Every hospital, whether it be small or great, possesses a

diet table which represents, or which is intended to represent, in a tabular form, the amount of nourishment which the patients may receive during illness or convalescence. To this scale, which simply indicates the articles of food employed in the full and ordinary diets of the hospital, are usually added numerous extra articles for special cases, which if placed on the ordinary diet score would either be unsuitable to the great bulk of the inmates, or would entail an outlay which few charitable institutions would be likely to incur. With the exception of a slight approximation, entirely fortuitous, in the dieting arrangements of some of the London hospitals, there is great diversity noticed in the diet tables of hospitals generally, not only in the classification of diets, but also in the amount and character of the nourishment provided for the patients. Enquiries conducted by legislative authority, as well as recent researches into the physiological and chemical actions of food, have thrown much new light on this subject, and have produced good results in the economical management of State institutions, and there can be no doubt that civil hospitals would be greatly benefited by the adoption of similar guiding principles with respect to the supply of food to their inmates. In estimating, however, the requirements of hospital patients, there are numerous difficulties to contend with which we do not meet with in other spheres of life, and which must always complicate, to a greater or less extent, any attempt to provide a diet table to meet all classes. Granted that the waste of tissue and the requirements of the system must be maintained by replacement in due proportion to that waste, there are various elements which must be taken into consideration in supplying the necessities of each individual case. These are, first, the altered condition induced by the disease or injury from which the patient is suffering, the age, sex, previous habits of life, and the manner in which these separate conditions may be met by the diet scale. From the varied occupations of the inmates prior to admission we have to deal with persons on the one hand who have been accustomed from their penury to a mere subsistence regimen, and on the other to those who have indulged to the fullest extent in food necessary to accommodate the wants of the organism to the wear and tear of laborious work.

In all inquiries of this kind, or relating to any abnormal conditions, it is of the first importance that we should fully appreciate the normal requirements of the body in a state of health. Ordinary experience accords with scientific research in proving that the wants of the system increase with almost mathematical precision in proportion to the amount of work required of it, and that any serious departure from this standard of accuracy is attended with disastrous consequences. The alimentary principles to which all food owes its potency, namely, the nitrogenous and carbonaceous, require to be thoroughly assimilated, and to be duly proportioned, to do their work effectually. Popular instinct and experience have for the most part harmonised with our requirements in this respect, but it occasionally happens, especially in drawing up rules of diet for others, that we are apt to forget the altered circumstances under which they are placed, and there are times also when the popular desire is all the better for examination, and (if need be) for correction.

It is generally assumed that a person in fair health, and taking a moderate amount of exercise, or performing an ordinary amount of work, consumes or ought to consume daily 27 oz. of water-free food, to keep the body in a healthy condition. Of this dry food it is usually estimated that about 4 oz., or rather less than one-sixth part, should be represented by purely nitrogenous substances, and that the remainder should be made up, in proper proportions, of fat, sugar or starch, which latter is easily convertible into sugar. In addition to this the consumer receives from the same food about an ounce of mineral matter, and there is sufficient water incorporated with the organic elements mentioned to raise the solid amount of aliment to nearly one half more, or to an average of 42 ounces. The total amount is further supplemented by the water contained in beer, milk, coffee, or tea, or drunk in its pure state, to the extent of 50 or 60 oz., making an average consumption close on 100 ounces of solid and fluid food per day. This estimate is of course greatly exceeded by the requirements of a person engaged in laborious work, and is proportionally diminished in those following sedentary occupations, or who may be leading lives of quietude and idleness, as is the case with hospital patients. For the mere subsistence of the body, to obtain

sufficient force to do the vital work required of it without waste, would require, according to the familiar analysis of Lyon Playfair, a diet consisting of little more than 15 oz. of anhydrous food, of which 2 oz. should be nitrogenous and 13·3 oz. carbonaceous, calculated as starch, the fatty element being generally estimated at two and a half times the value of the saccharine. This diet of bare subsistence is scarcely exceeded by that of the poor needlewomen in London, whom Dr. E. Smith has shown to be the worst-fed operatives in the country; and such is the ignorance prevailing in connexion with the nutritive value of foods, that the cost of providing the needlewoman's diet is about a third more than the cost of that of the Irish labourer, who is probably the best-fed operative in the kingdom. As a rule, there is a great disparity between the commercial and the nutritive values of different kinds of food, and there are few subjects on which the popular mind requires more enlightenment. There is great waste in certain articles, and of late years there has been a tendency among the poor, especially in large towns, to prefer dear and stimulating food to wholesome and economical. It is probably to this cause, more than to any other morbid condition, that it has been found necessary in most hospitals to supplement the diet scale with malt liquors and alcoholic stimulants to an extent quite irreconcilable with their nutritive value, and at a cost far exceeding that of the ordinary necessaries of life.

The condition of the hospital patient is essentially one of rest and quiescence. The wants of the organism are diminished from the diminished work required of it, and the amount of aliment necessary to maintain the vital processes in a state of efficiency is less than would be needed under most conditions of existence. This does not altogether arise from the coexistence of acute disease, for which proper nourishment is usually provided, but from the generally depressed condition of the patient, and the necessity for his retaining for a time at least the horizontal position in bed. Hence the diet required for the sick must necessarily be one of low nutritive value, occupying a position betwixt the subsistence diet and one of moderate work. Such a diet would be represented by about 21 oz. of water-free food, 3 oz. of which should be nitrogenous, and 18 oz. should be carbonaceous, calculated as starch. This seems a fair maximum

allowance for convalescents and for patients who are not suffering from organic disease, and it combines in proper proportions the two essential elements of which all food is composed. But it is not enough to lay down principles specifying simply the chemical value of the nourishment prescribed. It is found absolutely necessary in all dietaries for the sick to adhere strictly to the simplest forms in which food can be administered, so as to combine the largest amount of nourishment with the power of assimilation, and to select such as are easy of digestion and likely to be utilised in the body. The sick are notoriously fastidious with regard to their food, and any attempt to vary the diet scale with compound foods, such as are in use in workhouses, lunatic asylums, or private households, would frequently be attended with serious consequences. To avoid such obstacles to successful treatment, it is customary in most, if not in all hospitals, to have a uniform diet composed of the simplest foods, which will suit the majority of the inmates while at rest, whether they be suffering from injury or disease, with the power of increasing the allowance by simply adding to its quantity in the event of the recovery of the patient, or his ability and desire to take more. Under these two categories a general hospital should comprise on an average 80 per cent. of its patients, the claims of the remainder being met by such fancy articles of food as are provided by the diet scales of all hospitals for exceptional cases of disease.

Nearly all diet tables in use, and in fact most of our ideas respecting the uses to which food is employed in the animal economy, are based on the principles laid down long ago by Baron Liebig, but it is well known that of late years many of these principles have been called in question, and the experiments of numerous chemists and physiologists have thrown much new light on the subject. As the inferences deduced from those researches are likely to modify to some extent our views respecting the objects which certain alimentary substances are expected to fulfil, it may be necessary briefly to allude to them.

Liebig taught that the three essential constituents of food, the nitrogenous, the fatty, and the saccharine, performed each its special office in the animal economy; that the nitrogenous was alone capable of repairing the wasted tissues of the body;

and as animal food contained this element in excess, it was awarded the first place in all dietaries, and classified among what were usually designated as flesh-formers. The fat and saccharine constituents were supposed mainly to be engaged in the production of animal heat, although a portion of the former was stored up in the tissues of the body. It now appears from evidence which is all but decisive that a considerable portion of the albuminoids or nitrogenous matters taken into the system are simply wasted, and that the fatty substances in our food supply ingredients for growth and repair, while the saccharine elements in their production of heat have also their equivalent in the production of force formerly supposed to be maintained at the expense of the muscular tissues. If this theory be correct, and there is every reason to believe it is, greater importance must now be attached to the fatty and saccharine elements, and less to the nitrogenous, than has hitherto been the case. It does not follow from this that the albuminoids can be dispensed with in our food, since no tissue can be formed without them, and the experiments of physiologists prove beyond doubt that their participation is necessary in the manifestation of, and in the control of, the vital energies of the body. It may, however, be a question whether the nitrogenous elements may not be reduced with advantage in our dietaries, or be selected in larger quantities from the numerous cereals which are of low commercial value in comparison with the flesh of animals.

Before commenting on the diet in use in this and other hospitals, it may be useful to show in detail what are the requirements of the body under essentially different conditions of existence. The following table, taken from a series of researches by Lyon Playfair, fully illustrates this point :—

Daily food.	Nitrogenous.	Fat.	Starch and sugar.		Nitrogenous.		Carbonaceous, as starch.
	ozs.	ozs.	ozs.		ozs.		ozs.
Subsistence diet .	2·0 .	·5 .	12·0	=	2·0	+	13·3
Rest and quietude .	2·5 .	1·0 .	12·0	=	2·5	+	14·5
Moderate exercise .	4·2 .	1·8 .	18·7	=	4·2	+	23·2
Hard work . .	6·5 .	2·5 .	20·0	=	6·5	+	26·3

If represented by their equivalents of work or motor power, as determined by Frankland's experiments on the thermotic

and mechanical forces conserved in food, the subsistence diet would indicate a potential energy equal to 2815 tons raised a foot high, and the working diet to considerably more than double that amount, or to 5942 tons according to Letheby's calculation. But it is doubtful whether speculations based on the heat-producing and force-giving elements of food can aid us in estimating the value of hospital diets, since the nitrogenous elements must be in a great measure left out in the calculation. They are especially useful, however, in determining the amount and value of the fat and saccharine constituents which must now be looked upon as taking a more important position than they have hitherto done in all dietaries.

We have now to consider the means adopted for supplying our patients with a diet suitable for them in sickness and in recovery. As was previously noticed, the diet in most hospitals is represented by two scales, one indicative of the most generous diet allowed by the hospital, and usually given to men in a convalescent condition or suffering from injury, such as fractured limbs uncomplicated with constitutional symptoms, while the other is chiefly limited to females, children and male patients in the medical wards. The articles of food allowed, although they may differ in quantity and mode of preparation, are pretty much the same in all hospitals. The accompanying tables, for which I am indebted to the authorities of the respective hospitals, represent as nearly as possible the rations supplied daily for the two separate classes of diet alluded to, with the relative number on each class of diet, and the weekly cost of each, calculated from the prices paid at Guy's during the year 1871.[1] The figures relating to the numbers on the respective diets are for the most part taken for one day of the year only, but they only presume to give broad indications of the practice of the separate hospitals. Some discrepancies may also appear to exist with regard to the amount of aliment stated in the tables when compared with the printed diet tables of the hospitals specified, but this is more apparent than real, and has arisen from the practice of several hospitals to vary the quantity and character of several articles of food on certain days of the week. In the accompanying table a division has been made of the weekly allowance in such cases, to

[1] These are now considerably higher in amount.

make it applicable to one day. There will be noticed very striking differences with regard to the amount of aliment required for the principal diets referred to in different hospitals, and it happens not unfrequently that an apparent deficiency is brought up to a normal standard at the patient's own expense, or by the contributions of his friends. This is especially the case with the items tea and sugar and butter, which are still looked upon as luxuries in many establishments. The absence of these articles from the diet scales would be expected to reduce the expenditure materially in those hospitals where they are excluded from the diet scale, but, to judge from the expenditure tables, this is not necessarily the case. The same remark may be said to apply to several hospitals where a low class ordinary diet is in use. Here the necessity becomes apparent of adding materially to the daily aliment fresh articles not mentioned in the diet table, a practice both wasteful and unsatisfactory. In some hospitals the various requirements of the inmates are met by varying grades of diet of a somewhat complex character, which it is extremely difficult for the medical officer to remember and determine. In the army hospitals at home, according to Dr. Parkes, there are ten diets, comprising a minimum allowance of 8 oz., and a maximum allowance of $22\frac{1}{2}$ oz., of water-free food. The Middlesex Hospital and the Edinburgh Infirmary have each nine diets, and the diet table of the latter is prefaced with an appeal to the medical staff to familiarise themselves with the several scales, a somewhat difficult matter where there is so little difference in the relative amount of the nutritive ingredients. There can be no question that a multiplicity of diets involves considerable waste and confusion, and is frequently perplexing to the medical staff. It may also give rise to jealousy among the patients themselves. The principle of uniformity which guides the dieting arrangements of other institutions might be, and is, in fact, carried out by one large hospital, where there is but one general or house diet for the inmates, but there is an inconvenience apparent from the large number of patients in that establishment placed on extra articles of consumption. The best method is to have two diets, a full or extra, and a middle, ordinary, or house diet; these will meet the needs of the bulk of the patients, and the special class of patients

can readily be provided for by a low or abstinence diet, which can be strengthened at pleasure by the addition of any articles to meet special requirements. Such is the practice of most of the large hospitals, where long experience has sanctioned its continuance, notwithstanding numerous changes in therapeutic management.

The most generous fixed scale of diet in use at the following hospitals, with an approximation to the ordinary proportion of patients placed on it, and to the estimated weekly cost.

	Bread.	Dressed meat.	Potatoes.	Pudding.	Mutton broth.	Butter.	Tea and sugar.	Milk.	Eggs.	Porter.	No. of patients on diet.	Estimated cost per week.	
	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.	p. c.	*s.*	*d.*
Guy's	14	5	8	4	10	1	20	...	...	20	27	4	8¾
St. Barthol. .	14	8	8	...	...	1	40	...	...	20	62	5	7¾
St. Thomas's[1] .	12	4	4	8	...	¾	30	10	...	...	60	3	7¾
The London[1] .	12	6	8	8	20	...	...	...	1	20	7	4	9
St. George's .	12	6	8	...	...	1	20	10	...	20	2	4	11½
Middlesex . .	12	8	8	...	20	...	...	10	...	...	2	4	1¾
King's College .	12	4	8	8	...	...	...	15	...	20	24	3	11
University . .	12	6	8	4	15	...	...	20	...	20	54	4	7½
St. Mary's . .	15	6	8	...	...	¾	40	10	...	...	1	4	3¾
Westminster .	14	6	8	...	...	...	20	10	...	...	50	3	11
Seamen's . .	16	8	12	...	10	...	20	...	...	...	46	4	8¼
Edinburgh . .	17	6	...	...	20	...	...	30	...	...	20	4	1½
Glasgow[2] . .	14	4	8	...	40	1	32	...	...	...	...	3	5½
Manchester . .	16	6	8	...	...	¾	20	...	...	...	...	4	2
Newcastle[2] . .	14	6	8	...	10	...	20	10	...	...	91	3	11
Leeds . . .	16	5	8	...	5	1	40	20	...	...	1½	4	6½
Birmingham[3] .	12	6	8	...	20	...	20	...	...	...	4	3	8¾
Dublin[4] . . .	16	8	7	...	15	...	30	...	...	...	...	4	6¼

[1] This diet is called "mixed" at St. Thomas's and "fancy" at the London. The full diet, being of a less generous character, is placed in the next table.

[2] This is the "common diet" of the Glasgow and Newcastle Infirmaries. The next generous, being the "milk diet," is placed in the second table of diets.

[3] The returns refer to the General Hospital at Birmingham.

[4] The Richmond, Hardwicke, and Whitworth Hospitals only.

The second-class fixed scale of diet in use at the same hospitals, with the relative proportion of patients placed on it, and estimated cost.[1]

	Bread.	Cooked meat.	Potatoes.	Pudding.	Mutton broth.	Butter.	Tea and sugar.	Milk.	Eggs.	Porter.	No. of patients on diet.	Estimated cost per week.
	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.	p. c.	*s.* *d.*
Guy's. . . .	12	4	8	4	10	1	20	...	...	10	52	3 10½
St. Barthol. .	12	4	8	...	...	¾	40	...	...	10	17	3 7
St. Thomas's .	12	4	8	...	...	¾	30	10	...	...	13	3 4¾
The London .	12	6	8	...	20	...	...	...	...	20	36	3 10
St. George's .	12	3	8	...	...	1	20	10	...	10	75	3 6
Middlesex . .	12	4	8	...	20	...	...	10	...	...	48	2 8¼
King's College .	8	...	...	8	...	...	...	30	2	...	76	3 1½
University . .	12	4	8	...	20	...	...	20	...	...	31	3 0
St. Mary's . .	12	4	8	...	...	¾	40	10	...	...	90	3 4½
Westminster .	10	3	8	...	...	...	20	10	...	...	10	2 6¾
Seamen's . .	16	5	8	...	15	...	20	...	...	...	28	3 5¾
Edinburgh . .	18	4	...	...	20	...	20	...	...	...	60	3 0¼
Glasgow . . .	8	...	...	...	...	...	...	40	...	...	...	1 8½
Manchester .	15	5	8	...	...	½	20	...	...	...	...	3 7¾
Newcastle . .	12	...	...	...	20	...	20	10	...	...	8	1 4¾
Leeds . . .	16	4	8	...	...	1	40	20	...	...	75	4 0½
Birmingham .	12	4	8	...	20	...	...	20	...	...	86	3 0¼
Dublin . . .	16	4	...	...	8	...	30	...	...	...	...	2 10¾

Before noticing the separate items in the diet tables it is important to observe some peculiarities of the separate hospitals. As a rule, the provincial hospitals are less liberal in the amount of food supply than the metropolitan, although there are exceptions to this. With two exceptions, all the hospitals mentioned allow more than three ounces of dry nitrogenous food in their first-class diets, while the carbonaceous element, which ought to average about eighteen ounces, varies from thirteen ounces at the Middlesex to eighteen and a half ounces at the Leeds Infirmary. In the second-class diets the differences are still more remarkable. With five exceptions the nitrogenous element is under three ounces, while the carbonaceous ranges from nine ounces at Newcastle to eighteen ounces

[1] The weekly cost is calculated by the prices paid at Guy's in 1871. They were as follows:—Bread, the 4 lb. loaf, 6½*d.*; meat, 7*d.* per lb. (contract); potatoes, 3*s.* 6*d.* per bushel; milk, 8½*d.* per gallon (contract); sugar, 41*s.* per cwt.; rice, 12*s.* 6*d.* per cwt.; tea, 2*s.* per lb.; butter, 112*s.* per cwt. (contract); eggs, 9*s.* 6*d.* per 120; porter, 10*d.* per gall.

at Leeds. In the case of Newcastle this difference may be accounted for by the second class being the milk diet of the establishment, as it appears also to be at King's College and the Glasgow Hospitals.

In the analysis of nutriment no allowance has been made for the ingredients of the mutton broth, with the exception of the meat contained in it, and this omission may tell to the disadvantage of the Scotch and Irish hospitals, where it is usual to add several kinds of vegetables to the liquor in which the meat is boiled. The absence of any definite method of preparation prevents any satisfactory analysis suitable to all hospitals being made; and it is to be remembered that Ranke's analysis, on which the figures relative to cooked meat are based, includes the fat and juices of the meat which are dissolved or suspended in the liquor. To the other articles stated there might have been added gruel and barley-water, the administration of which it is customary, in some hospitals, to leave to the discretion of the nurse, but, judging from the little desire expressed for either of these diluents by our own patients who are placed on the ordinary diets, their consumption is likely to be very limited. Their value, however, is not to be overlooked among the various articles of food in constant use with the low or abstinence diet for special cases of disease.

Note.—The tables distinguishing the nutritive elements have been calculated from Letheby's table on the nutritive value of food, second edition, p. 5. The following foods are those in most use in hospital, and the composition of an ounce of each (= 437·5 grs.) is given in grains and tenths of grains, excluding water and salts.

	Albuminates.	Starch and sugar.	Fat.		Nitrogenous.		Carbonaceous as starch.
Bread	35·4	223·1	7·	=	35·4	+	240·6
Cooked meat . . .	120·7	...	67·5	=	120·7	+	168·7[1]
Potatoes	9·1	96·2	·8	=	9·1	+	98·2
Rice pudding . . .	22·5	110·2	17·6	=	22·5	+	154·2
Butter	...	...	363·1	=	...	+	907·7
Egg	79·6	...	134·3	=	79·6	+	335·7
Sugar	...	415·6	...	=	...	+	415·6
Milk	17·9	22·7	17·	=	17·9	+	65·2
Porter	·4	38·	...	=	·4	+	38·

[1] Ranke's analysis.

The amount of nutritive elements in ounces and grains in the diet tables of the following hospitals, being the most generous diet in use at these hospitals.

	Albuminates.	Starch and sugar.	Fat.	Nitrogenous.	Carbonaceous as starch.	Daily cost.
	oz. grs.	oz. grs.	oz. grs.	oz. grs.	oz. grs.	*d.*
Guy's Hospital . .	3 27	12 348	2 68	= 3 27	+ 18 81	8
St. Bartholomew's .	3 299	11 334	2 199	= 3 299	+ 17 393	9¾
St. Thomas's . .	2 427	10 212	2 66	= 2 427	+ 15 377	6¼
The London . .	3 255	11 276	2 30	= 3 255	+ 16 351	8
St. George's . .	3 94	11 35	2 238	= 3 94	+ 17 192	8½
The Middlesex . .	3 327	8 173	1 362	= 3 327	+ 12 421	7
King's College . .	3 123	12 178	1 319	= 3 123	+ 16 319	6¾
University College .	3 363	11 289	2 32	= 3 363	+ 16 369	8
St. Mary's . .	3 192	10 383	2 84	= 3 192	+ 16 155	7½
Westminster . .	3 157	10 160	1 241	= 3 157	+ 14 105	6¾
Seamen's Hospital .	3 397	11 414	1 291	= 3 397	+ 16 57	8
Edinburgh . .	4 113	10 98	2 159	= 4 113	+ 16 57	7
Glasgow . . .	2 246	10 22	1 368	= 2 246	+ 14 285	6
Manchester . .	3 119	11 31	1 425	= 3 119	+ 16 2	7
Newcastle . . .	3 158	10 159	1 241	= 3 158	+ 14 105	6¾
Leeds	3 286	11 394	2 184	= 3 286	+ 18 229	7¾
Birmingham . .	3 265	8 400	1 397	= 3 265	+ 13 298	6½
Dublin . . .	3 353	10 371	1 287	= 3 353	+ 14 432	7¾

Nutritive elements in the second-class diet used at the same hospitals.

	Albuminates.	Starch and sugar.	Fat.	Nitrogenous.	Carbonaceous as starch.	Daily cost.
	oz. grs.	oz. grs.	oz. grs.	oz. grs.	oz. grs.	*d.*
Guy's Hospital . .	2 268	10 398	1 424	= 2 268	+ 16 144	6¾
St. Bartholomew's .	2 178	9 392	1 262	= 2 178	+ 13 391	6¼
St. Thomas's . .	2 282	9 151	1 364	= 2 282	+ 13 404	5¾
The London . .	2 352	9 278	1 57	= 2 352	+ 12 202	6½
St. George's . .	2 216	10 91	1 387	= 2 216	+ 14 401	6
The Middlesex . .	2 282	8 173	1 93	= 2 282	+ 11 186	4½
King's College . .	3 8	8 263	2 370	= 3 8	+ 15 94	5¼
University College .	3 25	8 402	1 256	= 3 25	+ 12 401	5
St. Mary's . .	2 282	9 151	1 364	= 2 282	+ 13 406	5¾
Westminster . .	2 88	8 142	1 10	= 2 88	+ 10 385	4½
Seamen's Hospital .	3 0	11 29	1 85	= 3 0	+ 14 22	6
Edinburgh . .	2 315	10 145	1 26	= 2 315	+ 12 428	5¼
Glasgow . . .	2 124	6 68	1 299	= 2 124	+ 10 159	3
Manchester . .	2 402	10 246	1 260	= 2 402	+ 14 239	6¼
Newcastle . . .	1 165	7 256	0 254	= 1 165	+ 9 15	2½
Leeds	3 165	11 394	2 216	= 3 165	+ 18 58	6¾
Birmingham . .	3 24	8 400	1 262	= 3 24	+ 12 400	5¼
Dublin Hospitals .	2 244	9 136	1 12	= 2 244	+ 11 386	5

The ration of bread, which is properly supplied with all meals in all diet tables, ranges from a daily allowance of eight ounces, with the milk diet of King's College and of the Glasgow hospitals, to eighteen ounces, which appears to be given with the second-class diet of the Edinburgh Infirmary. As bread contains within itself the chief elements of nutrition in the relation of one part of nitrogenous to about seven of carbonaceous matter, and as it is, moreover, always easy of digestion and the most economical food we possess, it is desirable that it should take the first position in all diet tables. It is difficult to prescribe the exact amount of bread which a person should consume while in a state of inaction along with other articles of food, but in hospitals it appears that it ranges from a third to a half of the solid food taken daily. In prisons, workhouses, and lunatic asylums, it is usual to give a larger amount from economical motives, and to utilise flour in other ways, which cannot be carried out so well in hospital dietaries. The average allowance of bread given in the separate hospitals, with both diets, is three quarters of a pound, and most people with fair appetites, and limited to little variety in their food, do not find the quantity too much. When potatoes are prohibited, as is the case with some of the diets in the Scotch and Irish hospitals, the amount of bread is usually increased to a pound or to eighteen ounces, an equivalent certainly equal in chemical value to the ordinary allowance of potatoes, although a doubtful substitute for them in a sanitary and nutritive sense. The allowance of fourteen ounces of bread given with the full diets of Guy's and St. Bartholomew's may seem a large ration of bread when taken with the other amylaceous foods, but it is not found too much for a large proportion of the patients, and it not unfrequently happens that this allowance at Guy's requires to be supplemented from time to time by an additional loaf for division in a ward where all the patients are partaking of the full diet. For the most part there is little distinction made in the various hospitals referred to in the tables with respect to the amount of bread issued with the first and second-class diets, the average in each being three quarters of a pound. I doubt if this practice is satisfactory, as in a commercial as well as in an alimentary sense it is advisable to distinguish betwixt the two classes, and an increase in the

bread allowance for convalescents is fully as necessary as the marked increase of animal food allowed by nearly all hospitals with the first-class diet when compared with the second. As a material aid to the consumption of bread, and supplying, as it does, the fatty element in which bread is deficient, butter ought to be considered as an integral part of every hospital dietary. This is far from being the case, as we find only eight of the eighteen hospitals referred to which include this article in their diet scale. It does not follow, however, that its use is forbidden, although it is not specially mentioned, as in some hospitals the friends are permitted, if not encouraged, to bring butter to the patients. Weight for weight, butter is of about the same price as lean meat when cooked, but it is infinitely more serviceable, easier of digestion and assimilation, than any other form of fatty substance, and it is likely to be used at frequent intervals with bread during the day. Moreover, it does not seem that its absence from the diet scale makes any material difference in the average cost of the patients, as the deficiency must be made up by some other fatty element, either included in the class of other eatables in the table of expenditure, or by an extra allowance of milk, which is noticed usually to be given in excess where butter is disallowed. In no diet does the daily allowance of butter exceed one ounce, and this seems a fair average amount to give with the two fixed rates specified, as well as with the low or abstinence diet to which other foods may be added.

The importance of animal food in the form of butcher's meat, cooked in a way to be grateful to the appetite and administered in sufficient amount daily to meet the supposed requirements of the patients, is a point that has evidently been well considered in all diet tables. The highest ration of cooked meat allowed by the different diet scales is eight ounces with the first-class diet at St. Bartholomew's. A similar amount is apparently given with the extra diets of some Dublin hospitals, but as there are two fast days in the week in these hospitals the quantity stated cannot be referred to as strictly accurate. The general average with the first fixed scale is six ounces, and with the second four ounces, and their chemical equivalents are respectively 1 oz. 286 grs. of nitrogenous matter and 2 oz. 137 grs. of carbonaceous, with the first, and with the second 1 oz. 45 grs. of nitrogenous and

1 oz. 237 grs. of carbonaceous, in both cases calculated as starch, without water and salts. These amounts, free from bone and, generally speaking, containing but a spare quantity of fat, are given daily, and represent the main sources from which the nitrogenous elements of the food are obtained, and it is doubtful whether they can be selected from any other aliment in an equally agreeable form. The consumption of animal food, or rather of lean meat, has generally been considered necessary to the maintenance of the body in the highest state of activity, and the experience of the process of training practised by athletes shows to what extent the muscular energies may be developed by a strictly animal regimen. It is a question, however, whether these energies could not be maintained to better purpose by nitrogenous substances existing in vegetable foods; and there are valid reasons for affirming that a person at rest would be amply nourished by half the amount of nitrogenous food which is considered necessary for a person engaged in hard work. From the expenditure table it will be seen that the cost of butcher's meat in hospitals is three times that of any other aliment employed in the diet of the sick, and it is well known in all institutions that the outlay thereon continues to increase from year to year. It is, therefore, a question for serious consideration whether any means can be adopted to moderate this outlay by diminishing the amount hitherto thought necessary for invalid requirements, and by compensating for that loss by the substitution of other foods of an equally nutritive but of a far less costly character. In attempting a change of this kind the main difficulties, in all probability, would arise on the part of the patients themselves, who are accustomed to look upon animal food as their mainstay in illness, and who eagerly expect to obtain in hospitals luxuries which their position in life only permits them to obtain occasionally in their own homes. The question is still further complicated by the culinary preparation, which under other circumstances might have been so managed as to permit of a considerable admixture of fat and vegetable matter with a reduced amount of fresh meat, but the necessity of preparing meat for the fixed diets in one of the two forms of roasting or boiling precludes other means of cooking from being carried out. In only one hospital can I find any attempt to depart

from the routine alluded to. This is at the Leeds hospital, the diet table of which is remarkable for its substantial character, and contains among the ordinary articles a stew composed of meat, potatoes, and other vegetables, which appears to be given to the patients on two days of the week. The fancy diet of the London Hospital, which I have classed among the most generous diets in the table, alternates the roast meat with fish or rabbit; but this is done, no doubt, more with the view of variety than with any economical motive. The soup or broth made from the coarser parts of the ox, with the addition of nitrogenous vegetables, is probably the simplest way in which meat may be economised, and a diet of this kind is in general use in the Scotch and Irish and probably in some English hospitals. With the exception of the Seamen's Hospital, whose inmates are derived from all nations, and who appear to relish the diet, the soup ration finds little favour in any London hospital. It is inserted in the diet table of Guy's Hospital to be used on two days of the week occasionally during the winter months, and was carefully made of legs and shins of beef, with vegetables, chiefly peas, so as to allow each patient four ounces of meat with each pint of fluid, but it never met with much approval. To render it more acceptable as a diet, half a pound of rice pudding was given in addition, with an increased allowance of bread; but although relished by some for a time it usually met with a silent protest from the majority, and it was no uncommon thing to have half the total amount of soup unconsumed by the patients. Besides the aversion displayed for the diet, which, proceeding from a moral cause might possibly have been surmounted, I satisfied myself that it was the occasional cause of diarrhœa, especially among females accustomed to more solid food; a sufficient reason for suspending its employment. The same objection cannot hold with respect to the mutton broth in common use in several London hospitals. When roast meat is alternated with boiled, the liquor in which the meat is prepared may be utilised by the addition of rice or barley instead of being drained off as worthless. This fluid, in its pure state (that is to say, without the addition of vegetables), contains the salts and juices of the meat, together with a considerable amount of fat in suspension; it is, therefore, highly nutritive, and it is gross waste to

cast it aside as useless, as is done in some hospitals. The broth prepared as above is much relished at Guy's and other hospitals, and is usually partaken of after the regular dinner. It would be a simple matter to augment its nutritious value by the addition of other vegetables than those specified, but the dread of producing one or other of the phases of dyspepsia will always be a bar to their employment in the fixed diets of the London hospitals.

By far the most agreeable way of meeting the increasing consumption of animal food is by partly substituting for it one of the numerous cereals abounding in gluten and starch, though deficient in fat, with milk, butter or fat, in the form of pudding. It would not be difficult to extemporise a diet containing nutritive and chemical elements quite equal to meat, and at a fourth of its commercial value, in compounds of oatmeal, pease meal, beans, suet and dripping, but these articles are repugnant to a sickly appetite, and suggest visions of internal discomfort, which it were wise to avoid. It is safer to adhere to the farinaceous materials combined with milk, which established usage has confirmed to be the most suitable for the sick on account of their easier assimilation and digestion. These are rice, sago, arrowroot, corn flour, and bread itself, made into pudding, with milk, sugar, and eggs. A diet composed of one or other of these farinaceous materials as a basis occupies a first place among the extra diets of all hospitals, but it does not appear to have obtained that position in the fixed scales which its nutritive importance and small commercial value justly entitles it to hold. There are only five hospitals, and these are confined to the metropolis, in which pudding of some kind is introduced as an ordinary article in the full diet allowance, and only one in which it is given with the ordinary or second-class diet. At Guy's it is the custom to give it three times a week with the roast meat diet, in the proportion of half a pound, with a reduction of two ounces in the ordinary allowance of meat for such patients as are on full diet. In the table the amount is stated at 4 oz. daily, and the proportion of meat at 5 oz., but this represents rather the average weekly allowance when apportioned to the different days. The pudding presents no variety in its culinary preparation, as it is invariably confined to rice, milk, sugar, and a modicum of butter,

and is perhaps the least costly of any that can be prepared for the sick.[1] The cost of this food, calculated from the prices on which the estimates were based, is not more than $1\frac{1}{4}$d. a pound, while the cost of its equivalent in meat is $2\frac{1}{2}$d., and as regards the nutritive value the substitution shows a loss of $\frac{1}{4}$ oz. of nitrogenous matter, but a gain of 4 oz. of carbonaceous; add to this the fact that the diet is always more relished than that issued on other days, when a slight addition is made to the meat ration, and there are strong reasons for recommending its adoption daily with all diets, with a maximum allowance of 4 oz. of cooked meat. Such, in fact, is the practice pursued at St. Thomas's and at King's College Hospitals, the difference in the two fixed scales in the former institution being confined to the addition of 8 oz. of pudding with the full diet, and, to judge from the large proportion of the inmates who are placed on this scale, it appears to be in high favour with the medical staff. When pudding is given daily it is generally found necessary to vary its composition with corn flour, arrowroot, or bread, in which case its cost would probably be doubled through the addition of eggs, but the gain in the end would certainly be to the advantage of the patient as well as of the hospital. The amount of carbonaceous matter in the diets of nearly all the hospitals is much too small; and although there may be some excuse for supposing that most authorities on dietetics have erred rather on the side of abundance in their standards of requirement, there is every reason why the proportion of heat and force-producing food should not be allowed to fall below 15 oz., and it is difficult to accomplish this in hospitals in a more agreeable form than that stated.

With rare exceptions potatoes are in general use in the fixed diets of all hospitals. From their nutritive relations, which are as 1 of nitrogenous to 10 of carbonaceous, and from their possessing salts of an antiscorbutic character, they are doubtless the best vegetable we can employ for hospital purposes. Their enhanced price at certain seasons, and the difficulty experienced in obtaining them always fresh and good, compel us sometimes to find a substitute for them in green

[1] The ingredients used at Guy's for 16 lbs. of pudding, the allowance for thirty-two persons, are shown in the following formula:—Rice 2 lbs. 8 oz., milk 6 quarts, sugar 12 oz., butter 1 oz., spice 1 drachm; loss of water in cooking, say 37 oz.

vegetables, or in an extra allowance of bread. The allotted quantity of potatoes given with each diet amounts in nearly every case to half a pound, which with the addition of bread may be considered a fair proportion.

It is somewhat singular that potatoes, which are usually supposed to be one of the chief foods in Ireland, should be so sparingly used in the Dublin hospitals. In the three hospitals referred to in the table they are given only with the full diet and are limited to three days in the week; the quantity, however, amounts to one pound on these occasions, while the bread on the alternate days is increased to a daily allowance of twenty ounces. In other diet tables from Dublin hospitals potatoes are not even mentioned as an article of food, nor are other vegetables noticed unless as ingredients of the broth which is a staple article of diet in all the hospitals. Unless admitted among special articles of food for particular cases, no succulent vegetable except the potato is included in the general fixed scales of diet in English hospitals, but it must frequently happen that its employment is superseded either by an extra amount of bread, or by the issue of green vegetables either daily, or at occasional intervals. The chief object of this exchange must consist mainly in the value of variety, as the nutritive virtues contained in cabbage and tuberous roots are in a measure swamped by the large amount of water (being rather over 90 per cent.) entering into their formation. At Guy's cabbage is usually given twice a week in lieu of potatoes during the summer months, and with rare exceptions it meets with favorable acceptance. It is also customary during the hot weather to issue lettuce once a week instead of ordinary vegetables, and, although the habit may be condemned on account of the small amount of nutriment existing in the herb, the change is much relished; and as it is usually given with cold roast meat on Sundays, the cooking arrangements of the hospital can be dispensed with for the day. It would, however, greatly enhance the value of this food if it were accompanied with the addition of some vegetable oil and a small portion of vinegar.

The value of milk as a necessary part of the diet of the sick is shown by its universal admission into the diet tables of all hospitals, either as a diet by itself without meat, or as an integral part of the fixed scales. The ordinary milk diet contains

from one to two pints of milk, with generally some farinaceous substance added to form pudding, with or without eggs, and the form is convenient for adoption when more solid food, especially meat, is contra-indicated. As milk contains within itself all the elements necessary for growth and repair, as is shown by its capacity to support by itself the requirements of infancy, it is but right it should form the main constituent of the food of sick children, and that it should also be the mainstay of the low or abstinence diet of all hospitals. The milk diet of King's College and of the Glasgow Hospitals have been introduced into the second fixed scales in the tables, as the published diet tables of these hospitals seem only to recognise one fixed scale with meat, but the absence of meat in the milk diet of King's College is in great measure compensated for by the addition of eggs, which has the effect of raising the quantity of food administered daily to each individual to upwards of eighteen ounces of dry material. This is considerably above the average of the second-class diets with meat, and is even higher than several of the first-class diets enumerated, and to judge from the large proportion of the patients supplied with it, amounting to 76 per cent. of the entire inmates, it seems to meet with high favour in the hospital. It is very likely, however, that it may be supplemented with meat or beef tea, or some other extra, at the desire of the medical officer, as the aggregate nutriment of the fixed scale is barely sufficient to meet the requirements of the bulk of hospital patients. In practice it will be found infinitely more convenient to merge the milk and low diets together; so as to form a platform or basis to which extra articles may be added at pleasure for exceptional cases of disease; but as the diet itself should be sufficient to support life without unnecessary waste, it is highly desirable that it should consist of not less than twenty ounces of milk, with from eight to twelve ounces of bread, together with some farinaceous pudding and a small portion of butter. In eleven of the eighteen hospitals referred to in the tables milk is supplied as a separate ration in the fixed diets to an amount varying from ten to twenty ounces daily, a certain portion of it, no doubt, being appropriated for tea when this beverage is allowed. In other hospitals, where an allowance of tea forms part of the dietary, and where

milk is not entered as a separate article, four ounces of milk with an ounce of sugar daily is assumed as the ordinary accompaniment, and the elementary analysis has been made on this supposition. Although the amount of tea infusion ranges from twenty to forty ounces in different establishments, the ingredients, as a rule, amount to the same in nearly all instances, the daily amount of tea-leaf used for each individual being confined to a quarter of an ounce. I find that the amount of water added to the tea is generally a matter of choice with the patients themselves, some of whom, especially in the male wards, prefer a large draught, while females, as a rule, prefer a more concentrated beverage, and this, no doubt, explains the apparent discrepancies in the amounts given in the tables at different hospitals.

The universal use of tea as a supplementary food, being employed by rich and poor alike,[1] and a certain sustaining influence which it evidently possesses, have combined to render its adoption general in all diet tables, although in some instances it is left to the patients to provide it for themselves. Its mode of action is not very clear, and opinions differ very much with regard to its influence on the economy, but there can be little doubt that in moderation it favours digestion, and there is every reason to believe that it promotes the transformation of the fatty and starchy elements of food. Its action is therefore more of a physiological and therapeutic, than of a nutritive character, and it supplies a want in the diet scale which no other beverage can furnish so well. The sugar and milk which usually accompany it contain in the proportions specified not far short of 2 oz. of water-free food of an equivalent character and in relative proportion to the nutritive chemical elements found in ½ lb. of potatoes; and in addition to this the beverage forms a convenient and agreeable vehicle for the consumption of bread, which it is desirable to encourage in every way. By almost universal consent tea is preferred to coffee or cocoa as a morning or evening meal in the fixed scales of diet of those hospitals where it forms a part of the dietary. The only exception to this rule is in the practice of the Glasgow

[1] The Custom House returns for 1871 give 3 lbs. 15 oz. of tea for the annual consumption of each member of the community, being about a fourth less than the estimate for each hospital patient in those establishments where tea is allowed.

Hospital, where coffee is given for breakfast and tea for the afternoon meal. There is no reason why some concession should not be made to the patients themselves in the selection of their favourite beverage; tea and coffee possess the same restorative properties, are about equal in commercial value, and no great inconvenience can result from the double culinary preparation, which is usually carried out in the presence of, and sometimes by, the patients themselves. Of late years many hospitals, especially the Scotch and Irish, have substituted a tea meal for the rations of oatmeal gruel or porridge which were formerly the staple food of the working population, and the propriety of the change has been questioned, as the coarser food was supposed not to be without its salutary influence on the people, but there is little doubt that, as far as hospitals are concerned, the alteration is attended with benefit. The best way in which oatmeal can be used is in the form of gruel, to which sugar or treacle may be added at pleasure, and many hospitals permit the patients on the fixed diets a certain allowance of this food for supper, but it does not appear to find much favour. At Guy's the diet table authorises the use of gruel and barley water *ad libitum* for all patients, but, as a rule, they are seldom partaken of unless by the patients on the abstinence diets, for which class they are peculiarly suitable. As was previously remarked, tea does not form an integral part of the diet scale of every hospital, the patients being at liberty to provide it for themselves in those hospitals where it is not supplied, and there are strong reasons for applying this or a similar regulation—which, in fact, would take the position of a money payment—to hospitals supported by private benevolence, if it could be accomplished without detriment to the inmates. But the argument, which appears fair in theory, is unfortunately contradicted in practice, since it is found necessary to make up for the deficiency in some other manner, and the hospital is consequently no gainer by the transaction.

Although little mention has been made of the mineral matters existing in the food supply of hospitals, it is impossible to overlook their importance, since they are intimately associated with all the physiological changes taking place in the body, and absolutely necessary for its requirements in health as well as in disease. It is fortunate, therefore, that we possess in

the mixed animal and vegetable foods in use in all hospitals, a sufficient amount of mineral matter in the shape of salts to meet the requirements of the organism, while the varying tastes of the patients may be gratified by the addition of any amount of chloride of sodium (table salt) to their meals. Of course in the treatment of diseases depending on malnutrition the numerous salts which help to construct and repair individual organs suffering from decay or arrest of development are among the best therapeutic agents we possess, but in utilising them separately for this purpose we are removing them from the legitimate domain of the diet table to that of the pharmacopœia, with which they are more properly associated.

The only article in the diet scales of the hospitals to which allusion has not been made is the allowance of malt liquor, which is dispensed as a fixed ration in six of the full diets and in four of the ordinary diets in London hospitals. Malt liquors are largely used in all hospitals, but are mostly issued as supplementary to the regular diets, the exceptions being confined to the practice of the above hospitals. The older hospitals considered a brewery on the premises as necessary as a drug store, and the consumption of the favorite beverage was prone to extend to a wider range than the circle of patients, but of late years, except in some country hospitals, the supply has been usually furnished by contract from one or other of the large breweries. As far as London is concerned, the beverage usually preferred is porter, and in deference to the national taste it is entered in most diet scales either as a fixed food or as an auxiliary, nor could it well be abandoned without an efficient substitute being found to replace it. This substitute is usually found in milk, which is more largely consumed in those hospitals where porter is not recognised as a fixed ration, and in point of fact milk takes its place in that capacity in the diet scale, although it does not necessarily follow that the consumption of malt liquor is much diminished in consequence, since several hospitals where porter appears to be excluded from the ordinary diet scales are really amongst its chief consumers. The commercial value of the porter issued to the patients is about the same in bulk as milk, but the nutritive value, if we exclude the alcohol, is less than a sixth part of the value of milk, and this fact affords

a powerful argument why milk should always be preferred to the other if there is no substantial reason for adopting a different course. According to Dr. Parkes' analysis, a pint of good porter should contain an ounce of alcohol, with rather more than an ounce of sugar and extractive matter, along with free acid and salts, which together possess some tonic and assimilative properties altogether apart from the simple act of nutrition. Of themselves these principles are scarcely sufficient to explain the great favour in which the beverage is held by the poor, especially by those living in large towns, and we shall probably find a better solution in the instinctive desires, sanctioned and gratified by previous habits, for a supplementary food of a fluid character which, by its power of satisfying the appetite, lessens the necessity of and economises the amount of solid food, especially of the albuminates and fatty matters, and renders them more applicable for the wants of the system. On the whole, it would appear to be the better system to make the question betwixt beer and milk an optional one with the patient, and this, in point of fact, although not mentioned in the diet tables, is the practice in those hospitals where malt liquor is entered as a fixed ration. In Guy's milk is taken in preference to beer by a large proportion of the female patients and by a small proportion of the male patients in the medical wards, and is, of course, the main fluid food for children of tender years, but two thirds of the patients, as a rule, prefer their equivalent of porter, and, indeed, there is no article issued to them, in the prescribed due amount of which they evince a more jealous interest.

It might naturally have been supposed that the absence of malt liquors from the diet scale would have materially increased the consumption of other alcoholic stimulants, but, save in one notable instance, that of St. Thomas's Hospital, this does not appear to be the case. As a rule, it is found where there is a large consumption of beer there is also a larger consumption of wines and spirits, which are, no doubt, administered in the vast majority of cases with a view to dietetic effects. Considered simply in the light of a dietetic agent, no one can doubt the superiority of malt liquor over wines and spirits, but, viewed as an alcoholic stimulant in critical cases, it would be unfair to institute a comparison; nevertheless there must be

numerous instances in all hospitals where the weaker alcoholic beverage could be substituted with great advantage for the stronger. Of course, the first object in hospital work—and one to which every other must succumb—is the true benefit of the patient, and every hospital credits itself with this aim, however differently it may be performed; but a regard for the interests of the hospital in a pecuniary sense is scarcely less essential, and in no department of expenditure is this more likely to be overlooked than in that under consideration. If we take the commercial value of the chief alcoholic agents in constant use, we find that while an ounce of alcohol in the form of malt liquor costs $1\frac{1}{4}d.$, in the form of brandy it costs $3d.$, and of wine $4d.$; and these latter amounts are often greatly exceeded, and in many instances doubled, by the selection of higher priced liquors for hospital use. An opinion has also long been gaining ground, and has, indeed, been admitted by most medical authorities attached to hospitals, that the consumption of wines and spirits for medical purposes is much greater than it need be, that its too frequent employment has a demoralising influence on its recipients, and that, apart from all financial considerations, it could be reduced with great advantage to the sufferers. Of course, in attempting to compare the practice of one hospital with another in this item of expenditure, there are a variety of considerations totally unknown to the uninitiated of which account must be taken, nor is it reasonable to argue against the use of an important remedial agent in consequence of its abuse. A circumstance not usually taken into consideration by those who have drawn hasty conclusions from apparent discrepancies in the liquor expenditure of separate hospitals is the very different price paid for wines and spirits, it being no uncommon thing to find one hospital paying double that of another for corresponding specimens of liquor, and it is very doubtful whether the quality is improved in proportion to the increased value. It is generally understood and admitted that the consumption of alcoholic liquors bears a relation to the character of the diseases and injuries treated in the hospital, and that in proportion to their severity we must expect an increased relative consumption. This fact holds good when a comparison is instituted betwixt the various metropolitan hospitals, for, with the exception of the London Hospital, which admits a far

larger proportion of accident cases than any other hospital in the country, the class of patients received into the other general hospitals present a remarkable resemblance—a fact fully established by the disease lists now so generally published by the authorities of these hospitals.

The comparatively small consumption of stimulants in provincial and county hospitals is, no doubt, mainly attributable to the lesser severity of the diseases treated in these hospitals, and possibly, also, to the previous habits of the patients, most of whom belong to the country and are strangers to the deteriorating effects of town life; but, while fully admitting the influence of these and similar considerations affecting country hospitals, the analogy scarcely holds good when applied to hospitals in large manufacturing towns, as Birmingham, Newcastle, and Glasgow, where the class of diseases is equally severe with those admitted to London hospitals. The most remarkable instance of economy of consumption in the lists of expenditure is that afforded by the Birmingham Hospital, which must be among the most cheaply conducted establishments in the world, nor have we any reason to suppose that the diseases or injuries treated there require less alcohol than those treated elsewhere. It is a curious fact, and one scarcely reconcilable with preconceived opinion, that economy of expenditure in stimulants signifies also a corresponding economy in other articles of consumption more necessary to life; but the tables, if they teach anything, illustrate this most convincingly. Next to the Birmingham Hospital the Dublin hospitals, as far as stimulants are concerned, occupy a second place as regards economy, and this may possibly be accounted for by a clause in the diet table of these hospitals which apparently limits the allowance of malt liquor to half a pint when specially ordered as an extra, and the consumption of wine and spirits to four ounces when given with the fixed diets. These hospitals, however, occupy a peculiar position when contrasted with the others in the list. They are under a board of superintendence responsible to the Government, and they find accommodation for nearly 1300 sick, a number greatly in excess of the relative hospital accommodation of any other town in proportion to its population. A reference to the disease lists published in the report of the board also shows that

a large number of the cases entered are such as we should expect to find rather in the out-patient rooms of the London hospitals than in the wards, and the mortality throughout is consequently very much less than we are accustomed to in our experience of large hospitals in England and Scotland.

A matter of some importance in connection with the dieting arrangements is the hours at which the separate meals should be taken. Here, again, it is necessary to concede to the accustomed habits of the patients, even at the risk of interfering somewhat with the medical arrangements for visiting and dressing. The meals chiefly alluded to in the diet tables are breakfast, dinner, and tea, and the hours at which they are partaken of are usually 7 o'clock a.m., 1 o'clock, and 4 or 5 o'clock p.m., but it is necessary also to set apart a portion of the day's ration for lunch and supper. It is a matter of experience that most patients prefer a meal of some kind betwixt breakfast and dinner, generally about 11 o'clock, but with one exception this meal is not recognised in the diet tables. The exception referred to occurs in the case of the Newcastle Hospital,[1] where half a pint of mutton broth is issued for lunch, some time between breakfast and dinner. I find that in Guy's the beer or milk allowance is either wholly or in part consumed at this time along with bread and butter, very few preferring to take beer with the more substantial meal at dinner time. Most hospitals recognise only three daily meals, and where tea is not allowed a substitute is found for it in supper; but as it is an axiom in the treatment of the sick that they should eat often, even although they do eat little at a time, it is desirable that they should have two meals in the afternoon and evening. The supper meal, although not always mentioned in the diet tables, is allowed in most cases, and provision is usually made for it by a supply of gruel or mutton broth, but the majority of the patients on the fixed diets, when they desire a meal at bedtime (which, however, is less a rule than an exception), prefer setting apart a portion of the day's rations for the purpose. It is otherwise with the abstinence diets required by critical and special cases. These, as was formerly shown, often

[1] The whole subject of diet and hospital hygiene has recently been under discussion at this hospital, and the recommendations are embodied in a useful report published by the governing body.

take a larger amount of nourishment at repeated intervals than patients on fixed diets, and their last meal at night usually consists of beef tea, milk, or arrowroot, with or without the accompaniment of bread.

After comparing the dieting arrangements as established by the practice of various hospitals, it is important to ascertain how these influence the general food consumption in each separate establishment, and the cost at which it can be accomplished. It may also be necessary to consider the ordinary means of supply and selection, with the view of throwing light on the differences which exist in the food expenditure of different institutions. To illustrate these points tables have been prepared specifying the cost of the chief articles and of all the supplementary articles of food, as well as of malt liquors and alcoholic stimulants, used in eleven London, five English provincial, two Scotch, and three Dublin hospitals. To the columns of expenditure have been added the total number of patients resident in each hospital during the year (including those resident at the beginning of the year, with the numbers admitted during the year), and the average number of days each patient was resident. From this basis it would appear to be easy to calculate the cost for food expenses of each patient and the weekly outlay for maintenance, and this has been done with sufficient accuracy to suit the present purpose ; but it is necessary to remember that few hospitals observe the same exactitude with respect to the payment of their accounts, and that while some in the list may possibly include a portion of the previous year's expenditure, others may have allowed their expenses to accumulate from want of funds or from other causes to the following year. Another fallacy which I have tried to avoid as much as possible has arisen from the fact of few hospitals keeping their household expenditure distinct from that of the patients'—only four on the list observing this very convenient and salutary custom. From the courtesy of the gentlemen representing the chief London hospitals[1] I have

[1] I am indebted to the following gentlemen for the information contained in the tables :—Sir Francis Hicks, St. Thomas's; Mr. Cross, St. Bartholomew's; Mr. Nixon, The London; Mr. Wilkinson, St. Mary's; Mr. Wilson, The Westminster; Mr. Kemball Cook, The Seamen's Hospital; Mr. Grant, Birmingham; Mr. Blaney, Leeds; Dr. Thomas, Glasgow; and Dr. Martin and Mr. Hughes, Dublin.

Expenditure on articles of food consumption in the following hospitals, exclusive of household expenses, 1871.

	Guy's Hospital.	St. Bartholomew's.	St. Thomas's.	The London.	St. Mary's.	Westminster.
No. of patients	5549	6183	2092	5180	2095	1795
Days resident	37 days.	32 days.[1]	39 days.	35 days.	26 days.	30 days.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Bread	918 2 0	952 4 6	346 3 5	808 10 8	269 5 7	239 5 5[2]
Meat	3099 6 0	4456 0 0	1625 13 8	2776 10 6	832 1 4	903 4 4[2]
Milk	704 11 2	1004 18 3	368 17 8	1205 11 4	247 6 4	127 14 5[2]
Butter	596 2 5	734 16 0	510 19 6	...	273 3 0	...
Tea and sugar	531 0 9	615 5 0	210 12 6	...	156 7 7	133 10 9[2]
Other eatables	780 0 9	903 15 2	211 13 3	1272 17 0	207 18 7	237 10 11
Malt liquors	552 1 8	516 6 9	135 0 1	555 16 5	231 17 3	177 12 6
Wines and spirits	775 0 0	1046 13 8	770 8 1	912 0 8	421 0 7	423 6 0
Total	7956 4 9	10229 19 4	4179 8 2	7531 6 7	2639 0 3	2242 4 4
Expense, each case	1 8 8	1 13 1	1 19 11½	1 9 0¾	1 5 2¼	1 4 11¾
" " per week	0 5 4¾	0 7 2⅝	0 7 1¾	0 5 9	0 6 9⅜	0 5 10

[1] A few hospitals like St. Bartholomew's compute the mean stay by a calculation based on the average daily number of occupied beds, while the majority adopt the more elaborate and, no doubt, the more correct plan of dividing the aggregate number of days all the patients were resident by the total number discharged and dead during the year. The former method of calculation makes the average residence from three to five days less than the latter, according to the number of patients, a distinction which ought to be taken into account in calculating the weekly cost.

[2] One fifth deducted from these four items for twenty-five nurses.

Expenditure in articles of food consumption in the following hospitals, exclusive of household expenses, 1871.

	Leeds.	Birmingham.	Glasgow.	Seamen's.	3 Dublin Hospitals. House of Industry.
No. of patients	3203	3123	6540	2237	3305
Days resident	29 days.	31 days.	27 days.	26 days.	24 days.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Bread	379 17 6	348 5 1	842 11 10	364 0 8	653 19 6
Meat	1473 16 10	1100 9 9	2297 4 11	833 10 9	1204 3 6
Milk	318 14 5	335 3 9	944 4 2	291 3 5	515 15 10
Butter	267 3 11	16 4 0	462 5 10	17 4 5	...
Tea and sugar	282 12 9	19 14 9	317 19 1	81 13 7	389 4 10
Other eatables	373 1 2	196 15 0	1262 5 1[1]	306 16 4	128 13 1
Malt liquors	216 19 2	94 11 8	299 3 5	77 19 4	104 8 0
Wines and spirits	316 0 0	181 2 8	593 14 7	363 0 8	271 3 0
Total	3628 5 9	2292 6 8	7019 8 11	2335 9 2	3267 7 9
Expense each case	1 2 7¾	0 14 8	1 1 5½	1 0 10½	0 14 10
,, ,, per week	0 5 5⅝	0 3 3⅜	0 5 6½	0 5 7¼	0 4 4½

[1] This item includes £960 for eggs and fowls only.

Expenditure in articles of food consumption in the following hospitals, inclusive of household expenses, 1871.

(In calculating the expense of each case 25 per cent. has been deducted from all articles except wines and spirits.)

	St. George's.	The Middlesex.	King's College.	University Coll.	Newcastle.	Manchester.	Bristol.	Edinburgh.
Number of patients	3554	2013	1680	1672	1843	3155	2789	4972
Days resident	27 days.	30 days.	30 days.	29 days.	30 days.	31 days.	29 days.	31 days.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Bread	796 18 0	480 6 0	265 11 2	205 6 6	404 17 3	573 6 2	496 17 0	1228 10 11
Meat	3311 17 2	2732 7 2	1297 15 2	1113 10 8	1799 6 2	2438 8 5	2114 7 10	3371 4 6
Milk	711 0 6	444 18 0	370 5 1	399 0 4	582 3 4[2]	466 18 1	490 16 0	792 0 0
Butter	1193 7 0	284 17 10	453 8 0	345 17 6	194 11 11	528 18 8	332 11 0	699 3 1
Tea and sugar	545 8 6	334 17 9	...	...		263 8 5	218 13 6	643 15 8
Other eatables	700 4 11	901 10 9[1]	319 3 4	286 4 4	332 11 7	851 4 0	574 6 11	519 5 8
Malt liquors	574 4 6	502 13 0	253 4 9	238 1 8	215 14 1	416 16 3	389 15 0	226 16 9
Wines and spirits	810 13 0	518 13 3	361 16 2	416 16 2	153 17 10	544 0 6	300 7 0[3]	503 14 3
Total	8643 13 7	6200 3 9	3321 3 8	3004 17 2	3683 2 2	6083 0 6	4917 14 3	7984 10 10
Expense each case	1 17 $7\frac{1}{4}$	2 7 $5\frac{3}{4}$	1 10 $8\frac{3}{4}$	1 8 $9\frac{1}{2}$	1 11 $5\frac{3}{4}$	1 9 $9\frac{1}{4}$	1 6 $11\frac{3}{4}$	1 4 7
Ditto ditto, per week	0 9 $6\frac{5}{8}$	0 10 $11\frac{1}{4}$	0 7 $1\frac{3}{4}$	0 6 $11\frac{1}{8}$	0 7 $3\frac{1}{2}$	0 6 $8\frac{1}{2}$	0 6 $8\frac{3}{4}$	0 5 $6\frac{1}{2}$

[1] This item includes special diets which are kept separate from the ordinary diet account.

[2] This item includes eggs.

[3] This item includes spirits of wine.

been able to surmount this difficulty in several instances; and in cases where the separation of accounts was found impracticable a deduction of one fourth, or 25 per cent., has been made on all articles except wines and spirits, to meet the necessary expenditure of the household. The average cost as calculated in this manner may be open to question, since large hospitals, as a rule, are not so numerously officered as small ones in proportion to the number of patients; still, it is a fair average computation, and may be received as an approximation to the truth in the absence of more correct data.

The expenditure on the account of bread, the allowance of which in the diet scales of different hospitals was noticed to be very unequal, shows, as we might have expected, considerable diversity in amount, and in proportion to the extent of its consumption the expenses for other articles, as a rule, diminish. The tendency of recent years has been rather to lessen than to increase the consumption of this article, as in inquiries made with a similar object ten years since[1] it was noticed that bread next to butcher's meat was, commercially speaking, the most expensive item of the diet scale, whereas it is now in a measure superseded in many hospitals by other foods, such as milk, butter, and other eatables, which last mainly include medical comforts or special articles of diet. The supply of bread in most cases is obtained by contract, and differs little from what is generally furnished for domestic use, its value fluctuating with the price and quality of flour. During the year for which the accounts are taken the price was remarkably low ($6\frac{1}{2}d.$ the 4-lb. loaf), and this circumstance, no doubt, has influenced in some degree the marked contrast in the table betwixt the expenditure for bread and that for other foods. The flour employed is always that known as seconds, although the poor generally prefer bread of the whitest character, a circumstance that has given rise to the habit of occasionally adding alum in small quantities to the dough, a decidedly objectionable practice, but not carried to the extent that is usually alleged. There was formerly an opinion, and it is still entertained by some, that brown bread or bread made of the whole meal was equally if not more

Also to Mr. Todd, St. George's; Mr. Evans, The Middlesex; Mr. Waldron, King's College; Dr. Reed, Manchester; Mr. F. Page, Newcastle; and Mr. P. Bell, Edinburgh.

[1] 'Social Science Transactions,' 1862.

nutritive than white bread, and specially applicable on account of some occult virtues it possessed for hospital uses, but there is every reason to believe that the material composing the husk of the wheat, and which exists to the extent of 10 per cent. in brown bread, is both useless and indigestible. Although the system of contracts, by which hospitals are usually supplied with provisions, is liable to the charge of facilitating or rather of risking adulteration, it does not appear that the evil is much to be feared in connection with the bread supply. The only admixture which good flour is likely to undergo is that derived from ground rice and rivet wheat, with the object of increasing the bulk of the dough, but this is not difficult to discover, from the peculiar taste and sodden appearance which the bread presents.[1] To avoid any chance of fraud on the part of the manufacturer, there can be no doubt about the desirability of having the bread baked in the hospital, and if the hospital exceeds 400 inmates there is an economical advantage attending it as well. In Guy's, where bread is baked daily for 750 individuals, the cost of the four-pound loaf, including bakehouse expenses, is usually from one halfpenny to one farthing less than that obtained by contract by other hospitals, and there is always the security that the flour, which is obtained at the market value, has not been tampered with. A sack of flour (= 280 pounds) ought to yield ninety-three four-pound loaves when made by hand, but this number is slightly exceeded when recourse is had to machinery, as is now done in most large establishments where there is an abundance of unskilled labour. Some hospitals have lately been employing the aerated bread introduced many years ago by Dr. Dauglish, and are well satisfied with its use. This bread, as is well known, is made without yeast, carbonic acid gas being employed as a means of vesiculation; hence the process of fermentation is avoided, and no danger of acidity in the bread need be apprehended. Shortly after its introduction, and at Dr. Dauglish's desire, a test of the aerated bread was made in two of the medical wards at Guy's, and was continued about a fortnight, and the experiment showed that while it was much relished it was less satisfying than ordinary fermented bread;

[1] 'Government Inquiries into the Supply of Provisions — London Workhouses,' 1872.

that is to say, more of it could have been eaten with the fixed diets than the ordinary allotted allowance, which was certainly a strong recommendation in its favour. It is not likely, however, to displace ordinary fermented bread, from the prejudice which habitual use has acquired for the latter.

The high prices which the better descriptions of butcher's meat now command in the market render it necessary that this important article of food should be obtained by contract, and, notwithstanding some drawbacks to this system of supply, they are more than counterbalanced by the monetary advantages attending it. Considerable differences exist with regard to the character and description of meat used in different hospitals, and these are usually specified in the terms of tender. Some hospitals appear to use beef only, others only mutton, while the majority use both beef and mutton in varying proportions. The prices of the best parts of the ox and sheep are nearly equal, but the loss in cooking, and more so in carving, is much greater in mutton than in beef. Mutton is decidedly more in favour with the sick than beef, on account of its more delicate flavour and of its being easier of mastication. It also, as a rule, contains more fat in a state of admixture with the lean parts, and may, therefore, be considered more nutritious. The parts in most request are legs, loins, and shoulders, and most hospitals contract for these for roasting as well as for boiling purposes, while the thick flank and ribs of the ox are usually the only joints employed when beef is used for roast meat diets. In the majority of the London hospitals roast meat is alternated with boiled, but roast meat as a fixed diet has not yet come into general use in many provincial hospitals, its place usually being substituted by chop or steak. One of the main difficulties to surmount in connexion with the meat supply arises from the ever varying differences in the weight of the meat produced by the process of cooking, arising partly from differences in the quality of the meat and partly from the methods pursued in preparing it. Fat meat, of course, loses more than lean meat, but much less than lean meat of poor quality. It is no uncommon thing to see a couple of joints of equal weight placed in the oven, and on their withdrawal to find that one has lost in weight half as much again as the other, although both have been subjected to the same amount

of heat. This loss is variously calculated in different hospitals, and usually ranges from 20 to 30 per cent. of the weight of the meat, exclusive of an additional loss in bones and carving, which in the best joints is seldom less than 10 or more than 15 per cent. In a series of experiments I formerly made on the waste involved in the different systems of cooking,[1] the average loss, inclusive of bones and distribution, amounted in mutton to 33 per cent. of the weight of the uncooked meat, the maximum loss occurring in joints cooked by gas or before the fire, and the least by baking in a close oven, the system pursued at Guy's Hospital. Of late years it has been found necessary to allow a somewhat larger percentage for waste, possibly from the fact of the quality of the meat having deteriorated with the increase of price and difficulty of supply, and the substitution of foreign mutton, chiefly Dutch, which is inferior to that grown on English pastures. It is now found necessary at Guy's (and from inquiries made elsewhere the same rule obtains) to allow not less than 40 per cent. on the original weight of mutton, and 30 per cent. on that of beef, for losses sustained in cooking and in distribution. One hospital goes so far as to allow 50 per cent., or one half, of the weight of the meat for waste, but this is evidently too large a margin, unless with very poor and bony meat. The loss by boiling is, of course, less, from the utilisation of the juices and the salts, which are retained and consumed with the liquor. Nearly all hospitals and many other public institutions now employ gas in preference to open fires and baking ovens, for the purpose of roasting; and apart from the cost, which is about the same as that of cooking before an open fire, although somewhat greater than that of the close oven, the gas process has the additional advantage of being more under control and infinitely more cleanly than the others. A great advance has lately been made in the process of gas cooking by Mr. Leoni, of the Adamas Works, Islington, whose system has been at work in the London Hospital for the past two years, and has given general satisfaction. The great advantage of this system, which economises gas by diluting it largely with atmospheric air, consists in the very small loss in weight of the meat by the process; the

[1] Op. cit.

juices and fat, instead of being separated, as is the case in the ordinary process, now becoming thoroughly incorporated with the meat, a point of great importance in a nutritive as well as in a commercial sense. By the system in question the waste in cooking mutton has been reduced from 30 to 15 per cent. in the weight, and of beef to 20 per cent. ; and Mr. Day, the steward of the London Hospital, informs me that, according to his present estimates, on the supposition that the hospital is fully occupied, a clear saving is effected by the new process amounting in this one article to £426 per annum. Apart from the ordinary diets a large portion of beef is consumed in most hospitals in the preparation of beef tea, which has long been an essential part of every dietary for the sick.

Nearly every hospital has its own way of preparing beef tea, some preferring to use the prime parts of the ox for the purpose, but the majority appear to give the preference to the lean portions about the neck, usually called stickings, and which may be had at a cost of from 2*d.* to 3*d.* a pound less than the others. It has been the custom, of late years, for many hospitals to add a certain proportion of beef essence or extract to the fluid, either with the object of strengthening or of economising it, and there have been instances where the extract has been made to replace altogether the ordinary beef tea. There is, no doubt, a fallacy connected with the supposed nutritive properties of this preparation, which has of late years come into such general use; but since Baron Liebig's admission that it is not nourishment in the ordinary sense of the word, coupled with the knowledge we possess of its chemical constitution, it is not likely to advance in public estimation, nor can it ever be recommended in hospitals as a substitute for the fresh infusion of beef, which, when properly made, should contain, either in solution or suspension, the fibrin, albumen, gelatin, and a certain amount of fatty matter, all of which are absent in the so-called "extractum carnis." The extract, however, is likely to retain its ground as a valuable auxiliary and as a therapeutic agent, since it contains much valuable mineral matter in the form of salts, and it also possesses much appetising meat flavour, which together contribute to give a restorative and diffusible stimulant effect to its action. It is not much relished as a substitute for beef tea

by hospital patients; but there can be little doubt, from its facile assimilating properties, that it aids digestion and conserves the tissues, although it may not possess any active nourishing virtue. A preparation to which the maker has given the name of "fluid meat" has been, at the suggestion of Dr. Pavy, manufactured by Mr. Darby, the chemist in Leadenhall Street, and which, if better known, would probably displace other extracts, inasmuch as it preserves intact the chief alimentary constituents of the meat. In this preparation the albumen and fibrin are in a state of solution and in a condition ready for absorption, and it has been used much of late in the hospital in cases of great exhaustion with good effect. In its ordinary condition it is not unpleasant to the palate, and may be eaten with bread; but it is greatly improved by the addition of butter, whether taken in the solid form with bread, or dissolved in water as a substitute for beef tea or strong soup.

It has been generally thought that the introduction of Australian meat in its preserved state would prove a great boon to hospitals, as it might be used in the place of the higher-priced fresh meat, but very few hospitals have ventured on using it as a substitute. However serviceable it may be found in prisons or workhouses, it is very doubtful whether it would be received with favour by the sick, whose tastes are usually more capricious on the question of meat than of any other article in the dietary. The meat sold in sealed tins is usually overcooked, the juices and gelatinous matter separated from the fatty and fibrous, so that it is a difficult matter to present it in a savoury form before a sickly appetite. The most likely method in which this could be done, in ordinary circumstances, would be in the form of Irish stew, but even this preparation would be found objectionable on account of its ingredients, which will always prevent it from becoming an integral part of a hospital dietary. In an attempt made last summer to induce some of the male patients to partake of the preserved meat in lieu of fresh, I found that the knowledge of its having been largely used by prisoners and paupers militated greatly against its favorable reception, and that, like many other problems in social life, this question was more likely to be solved by a levelling from above downwards in the social scale than by attempting to reverse the process. It is found,

however, convenient in hospitals to have a portion of the meat continually in reserve in cases of emergency, to make good the supply of fresh meat when it is deficient, or when it has gone off, as it is familiarly termed, in the process of cooking.

Perhaps the greatest objection that can be urged against a contract supply is afforded by the way in which the important article milk is usually supplied to hospitals and other kindred establishments. It is a fact well known to milk dealers themselves that it is impossible for them to supply genuine milk with a profit at less than from 10*d.* to 1*s.* per imperial gallon, but there is so much competition in the trade that it is no unusual thing for them to tender to furnish pure milk at prices varying from 7*d.* to 10*d.* The natural result of this state of things soon shows itself in the quality of the milk furnished, which is oftener than otherwise largely adulterated with water. Out of forty-one samples taken from the various London workhouses last year by a commission, only six were found to be genuine,[1] and eight specimens taken indiscriminately from the chief London hospitals were all found wanting.[2] It would appear from this that a certain admixture with water was the normal condition of the milk supplied at low contract prices, and so general has the deterioration of the quality become that an idea prevails in the minds of many people that it would be dangerous to administer pure milk to persons who had long been accustomed to the spurious article, an opinion which I find still entertained in more than one hospital. It is scarcelynecessary to say that this is an absurd delusion, or that every precaution should be taken to insure the delivery of pure and unadulterated milk. The means of ascertaining the purity of milk are so extremely simple that they can be practised by any one on whom the duty devolves of receiving it, after slight instructions. An experienced eye and taste can generally detect the presence of water in milk, but it is safer to employ the lactometer to test the specific gravity and the measure to indicate the percentage of cream daily with each supply. There are, no doubt, fallacies connected with the employment of these instruments, but their importance has been greatly overrated, and the two com-

[1] 'Workhouses—Supply of Provisions.'

[2] 'British Medical Journal,' 1872.

bined may be relied on for giving sufficiently accurate results for ordinary purposes. The specific gravity of genuine milk should not be under 1028, nor should it contain less than 8 per cent. of cream, and it ought to furnish, on evaporation, a solid residue of not less than 12 per cent. Water is the only agent that we have to fear in milk adulteration, although I have known common salt to have been added to hospital supplies, no doubt with the view of increasing the specific gravity; the latter agent, however, cannot be mixed in sufficient quantity with the milk to alter materially the specific gravity without being at once detected by the taste. On making some inquiries lately in view of a new contract for milk for the hospital, I found some striking differences betwixt samples of milk furnished to the hospital and to private individuals, the details of which are so suggestive that I am induced to give them in a tabular form. The milk supplied to myself came direct from the country, that for the hospital was understood to be derived from a similar source, while that from a neighbouring dairy was the produce of cows fed in London.

	Sp. gr.	Solid residue per oz.		Per cent.	Price per quart.
Supplied to self	1028	54 gr.	=	12·35	4*d.*
Supplied to hospital	1019	32 „	=	7·32	$2\frac{1}{8}$*d.*
Dairy in Southwark, 1st quality	1030	52 „	=	11·90	5*d.*
Ditto, 2nd quality	1029	46 „	=	10·52	3*d.*

The prices charged scarcely indicate the true commercial value of the milk, that supplied to the hospital being a great deal too high in price, while the second quality of town milk is less by comparison than the others. It is a question how far the Food Adulteration Act will affect the supply of milk to second-class customers, as it is impossible to supply cheap milk without watering it, and few salesmen would be willing to admit that the milk vended by them had undergone dilution. The Act, however, affords us a protection which we never before possessed of obtaining a genuine supply of milk by contract, the terms of which should in all cases be minutely specified, so as to guard against the possible addition of water.

The remarks relative to the milk supply are equally applicable, though in a minor degree, to that of butter, which will

probably ere long become an integral part of every hospital dietary. It is not likely that any but salt butter will come into general hospital use, in consequence of the perishable nature and high price of fresh butter. From the great varieties of butters in the market, and their numerous range of prices, it is doubtful whether this important article should be obtained by open contract, as it is very difficult for salesmen to furnish the same or a similar quality to that contracted for at all seasons of the year. Of recent years the range of contract prices has extended from 86*s*. to 120*s*. per cwt. for Jersey, Irish, and Dutch butters, the qualities in general use in hospitals and charitable institutions, while the better flavoured butters, known as Friesland and Dorset, run from 120*s*. to 150*s*. per cwt., and are but sparingly used for hospital purposes.

The chief adulterations we have to contend against in butter are an inordinate addition of salt and water to increase its bulk. Butter readily absorbs both water and salt in varying proportions; but it should not contain more than 12 per cent. of the former or more than 5 per cent. of the latter, although it may be made to take up as much as 25 per cent. of water and 12 per cent. of salt, and yet be vended as good butter. It is not difficult to detect these agents when in excess. Farina, glucose, and gelatin, are said to be occasionally used to falsify butter; but out of fifty specimens from the various workhouses, examined by Mr. Wanklyn, not one was found to contain any of these ingredients.[1] A more probable cause of adulteration, and one which, unfortunately, we have no good means of detection, is that derived from the addition of suet and other fatty substances, possibly of an equally nutritious, but of a smaller commercial value. The only means of obtaining a fair quality of butter, or, indeed, of any other class of goods, is by a knowledge of the marketable value of the various qualities, and by giving such a price for it as will remunerate the salesman.

With reference to the supply of malt liquor it is scarcely necessary to state that little dependence can be placed on it being of an essentially pure and wholesome character unless is is obtained direct from one of the large breweries. The price

[1] Op. cit.

usually paid for it is 33*s*. per barrel, less discount, which makes it about 10*d*. per gallon.

Although the supply of alcoholic stimulants can scarcely be regarded as coming under the category of food, they form an expensive item in the expenditure of every hospital, and ought to be considered in connexion with hospital maintenance and economy. There is little fault to be found with the stronger qualities manufactured for home consumption, as whisky and gin, which are administered in the Scotch, Irish, and English hospitals as a concession to the acquired tastes of the respective nationalities, but there are great varieties in the various kinds of brandies in constant use. These are of all degrees of price and strength, and, although they are ostensibly sold as French spirits, it is doubtful whether the majority are prepared from the juice of the grape at all. If good French brandy is too high priced for ordinary hospital use it is better to have recourse to the best substitute for it, which we possess in the brandy of British manufacture, which may always be had of an equal strength and at a cost considerably less than that of the numerous foreign importations which are foisted on the market. The difficulties in securing good brandies are equally applicable, though in a different direction, to the supply of wines. Whatever changes may have occurred in the tastes of the public with regard to wine, universal experience still shows a preference for the port wine of commerce for hospital purposes, and there is no article of consumption more likely to be tampered with, nor which exhibits a greater variety of price and quality. Care in the selection is consequently doubly necessary with regard to this important medical comfort, and it is very questionable whether it should ever be obtained by open contract. Individual tastes generally differ with regard to the qualities which good wine ought to possess, and chemical knowledge can do little more than ascertain for us the amount of spirit, cane sugar, and acidity, of the analysed sample, so that it is better in all cases to leave the selection to experts in the trade, who are sure to know more about it than hospital committees. The red wine used at Guy's during the past twelve years is obtained from Tarragona, and is probably produced from the vineyards of Aragon or Valencia. It is a pure fruity wine, containing on

an average 16 per cent. of absolute alcohol and 10·3 per cent. of cane sugar, and may be had for about £30 a pipe, inclusive of duty, a price equivalent to 5*s.* 3*d.* a gallon. Although of a perishable character, and requiring to be used within a few years of its growth, there can be no doubt that this wine is of an essentially pure and wholesome character, and may be advantageously substituted for many fictitious ports sold at twice and three times the price.

In connexion, not only with the supply of wine, but of other articles of consumption of foreign and colonial growth, it is a well-known fact that they may be obtained in bulk at a much less cost and of a better quality through the agency of respectable brokers than by retail dealers, who are mostly in the habit of contracting for their supply. Where the consumption is considerable, it is wiser, therefore, to adopt this method of obtaining them in preference to the latter, especially with such articles as tea, sugar, rice, and arrowroot, which now form not the least important portion of the dietary of every hospital.

It may appear, perhaps, superfluous to refer to the subject, but in bringing these remarks on hospital dietary and economy to a conclusion I cannot avoid noticing that unless there exists in each establishment a disposition on the part of every one connected with it to assist the executive in a judicious control over the ordering and distribution of articles of consumption, it is hopeless to expect that a hospital can be satisfactorily managed. No other department presents equal facilities for abuses, or similar obstacles to their rectification when these have become hallowed by routine. It is only by unity of administration and a zealous co-operation on the part of the medical staff, as well as of the subordinate officials, that the desirable aim can be attained.

SOME CASES OF HYDATID DISEASE.

BY S. O. HABERSHON, M.D.

IN the 'Hospital Reports' for 1860 I published several cases of hydatid disease, and the following additional instances are worthy of being placed on record; they illustrate some of the difficulties in diagnosis, and they show the importance of early and decided treatment when the nature of the malady is ascertained..

CASE 1.—*Hydatids in the Lung; Hæmorrhage; Tuberculosis; Ulceration into the Pulmonary Vein.*

(Reported by Messrs. A. BUCHANAN, WHITAKER, and SEYMOUR.)

Robert G. A—, aged 17, residing in the Old Kent Road, was admitted into Guy's Hospital, under Dr. Habershon's care, on January 15th, 1872. He had had typhus fever when a child, but had enjoyed good general health till three years ago; at that time he went to work in a printing office, and after six months began to spit blood, in little clotted pieces about the size of a threepenny-piece. He then applied at St. Bartholomew's, and attended as an out-patient. The hæmorrhage continued in greater or lesser degree till his application at Guy's Hospital. For five weeks before his admission he attended as an out-patient, but on the 14th he coughed up nearly a pint of blood of a florid red colour; this attack of greater severity led to his admission. He had never been troubled with much cough, but a slight hawking accompanied the expectoration of the blood. During the last year he had become thinner, but his appetite continued good; there

had been slight perspirations. He was an anæmic though healthy-looking lad. There was some rhonchus heard in the chest, and at the base of the left lung there was dulness with roughened expiration. Temp. 99·3°, pulse 80, resp. 23, urine healthy. Dr. Moxon had detected in the membrane expectorated before admission the plicated foldings of a hydatid cyst, and it was, therefore, believed that the hydatid was located at the lower part of the left side of the chest, perhaps in the mediastinum.

Saline mixture of citrate of potash was ordered, and afterwards steel wine. His health improved; slight enlargement of the tonsils was relieved by the application of glycerine of tannin, but he was kept in the hospital till the beginning of April, when he was sent to a convalescent home. On July 29th he was readmitted, having two days previously coughed up about half a pint of black blood, and again on the day of admission; there was dulness and bronchial breathing at the base of the left lung, with febrile excitement; the temp. was 100°, and on the 2nd of August it became 102·3°. On the 14th he was much worse, and brought up nearly a pint of blood, and he complained of great pain in the left side.

The hæmorrhage recurred on the 16th, again on the 19th and on the 30th. The pulse and prostration increased, and he sank on the 31st.

Inspection was made by Dr. Fagge twenty-three hours after death. "The brain was fifty-eight ounces in weight and very anæmic. The seat of the old hydatid cyst was indicated in the surface of the left lung by a deep puckering, extending completely across the lower lobe. The cyst itself was about the size of a walnut. It had a little yellowish matter (cheesy) adherent to its walls. There was no trace of any hydatid membrane, so that its nature could not have been made out apart from the history. It contained a loose reddish-black coagulum, adherent at one part, where it passed into a decolorised substance. A large bronchial tube opened directly into the cavity, so large in size that it was within an inch or two of the bifurcation of the trachea, and a smaller bronchial tube also opened into the cavity.

"The branches of the pulmonary artery were traced downwards, and a large branch was found to run over the wall of

the cavity in immediate contiguity with it, but no twig of it could be found passing into the cavity. The vein could not be traced from above, but it was found that immediately below the cavity, towards the edge of the lung, there was a dilated vein, measuring half an inch in circumference, which had been perforated and opened directly into the cavity. This had evidently been the source of the hæmorrhage. It was, in fact, a pulmonary varix. In the bronchial tubes of both lungs and the trachea were elongated coagula of blood. The pulmonary tissue contained scattered tubercles in considerable numbers. They were more abundant in the left lung than in the right, and in the left lung they were more numerous around the cavity than towards the apex, and there also they were slightly yellowish in tint. In the right lung the tubercles were less numerous, and more abundant at the apex than at the base. The tubercles themselves were most typical in appearance. There was nothing whatever to indicate that they had arisen from the hæmorrhage, but their presence and mode of distribution might be urged as arguments in favour of the secondary nature of tubercle. Just above the cavity there was a small enclosed cyst of calcareous matter, close to the bronchial tube which opened into the cavity. The liver, spleen, and kidneys were healthy."

The appearances presented by the hydatid cavity in the lung are shown in the Plate appended to this paper.

Hydatids have been found in almost every part of the body, but with greater frequency in some structures than in others; the liver is the most frequent locality, probably on account of the greater facility of entrance from the intestinal tract; but numerous instances are recorded of hydatids locating themselves in the lungs. The case just narrated is one of clinical interest, not only on account of the manner in which a fatal termination was produced, namely, ulceration into a dilated pulmonary vein, but also from the development of tubercle during the course of the disease. By far the most frequent cause of death in hydatid disease is injury to or inflammation of adjoining viscera; thus, rupture of a cyst will induce fatal peritonitis or pleurisy; in other instances suppurative changes connected with the immediate parts surrounding the cyst lead to general disturbance of the system; or it may be

that the increase of the cyst and its direct pressure may cause a fatal issue. These conditions might be abundantly illustrated from cases which have been in the hospital.

The diagnosis in this instance was sufficiently clear, for when the patient presented himself amongst the out-patients a gelatinous mass was brought, which, on examination, presented the beautifully marked striations of a hydatid cyst. The question naturally arose as to the exact location of the hydatids, whether in the lung or in the mediastinum, or whether it had passed into the lung from the liver or the spleen. In a second case which I have here narrated the hydatid came from the liver, and in a third the mischief commenced in the spleen; but in the instance now detailed there was no evidence of any abdominal disease, and it was believed that the thoracic viscera were alone affected. After watching the case for several weeks no further portions of cyst were expectorated, but it was found that the lower lobe of the left lung was involved in inflammatory action, as shown by local dulness, minute crepitation, and afterwards bronchial respiration. These signs pointed out the seat of the hydatid, but a doubt still remained whether the lung was primarily diseased, or whether the cyst had passed into the lung from the posterior mediastinum. The consolidation, however, gradually disappeared, and the patient left the hospital apparently well; fresh exposure to cold and wet caused new disease at the damaged part, for inflammatory disease was again induced and ulceration was set up. This second attack of disease came on during an impaired state of general health; there was blood change, and tubercular deposit took place in other portions of the lung. This was shown in the post-mortem examination. There was no fact to prove the existence of tubercles prior to the second attack of pneumonic disease; hæmoptysis and failing power may have been due to the earlier stages of hydatid development in the lung. The tubercular deposition was probably the effect rather than the cause of the last pneumonic attack, and we regard this fact as an argument in favour of the idea that tubercle is often of secondary character, rather than the primary disease. It was remarked by Dr. Fagge that the tubercles around the hydatid cyst were more numerous than at the apex of the lung, as pointing to a connection

between the changes around that cyst and the deposition of the tubercles. Thus a man was admitted under my care who had received a severe blow from the end of the shaft of a cart beneath the right clavicle. The blow had bruised the lung and had caused hæmorrhage; the lung tissue at the part became infiltrated with blood, and afterwards consolidated from pneumonic change. The man, previously strong and healthy, died from phthisis, and tubercles were found in the lung, and a vomica was present at the right apex. The damage to the lung was followed by impairment of general health, and by the deposition of tubercle and by phthisis ; and so also we think in the young patient with hydatid, the hydatid was the first link in the chain of the fatal disease, then pneumonia, then the impairment of health and tubercle. The immediate cause of death in the patient with hydatid disease was not strictly phthisis, but the ulceration at the seat of the hydatid cyst, extending into one branch of the pulmonary vein, and thus causing fatal hæmorrhage. In the examination no cyst could be recognised, but at the site of it was a pneumonic cavity. In hydatid disease of the liver ulceration sometimes extends into the hepatic vessels from the cyst, but in this instance the cyst had been removed, and the subsequent inflammation caused the fatal ulceration.

It was unfortunate that before the patient had completely recovered from all effects of the first inflammation he became again exposed to fresh exciting cause of disease, but he seemed quite convalescent before he left the hospital.

Case 2. *Hydatid Disease in the Liver ; Perforation of the Lung ; Expectoration of Hydatid Cyst ; recovery.*

William B—, æt. 43, was admitted under Dr. Habershon's care, September 12, 1864. Some years ago he had been a soldier in India, and his health began to fail about five years before the present illness. There was enlargement of the liver, but neither jaundice nor dysentery. Two years later he was invalided home ; he went to Yarmouth, then to Fort Pitt, but eventually he left the service. The tumour ceased to enlarge, and even began to lessen in size, his health improved, and he was able to do work as an excavator. For a long time

the act of drinking had produced uneasiness at the stomach. Three weeks before admission pain in the right side came on, then cough, and suddenly he expectorated pus; occasionally the pain in his right side became severe, but he was able to continue at work till September 6th. Two or three days before he came to Guy's he expectorated a large mass of clear membrane; and on examination this was found to consist of hydatid cyst; the microscope showed delicate foliated membrane, with granules and blood-corpuscles, but no hooklets could be found. He was a well-made man, strong and muscular, rather pale, but free from urgent dyspnœa or distressing cough.

Chest.—There was imperfect action on the right side, and dulness at the base; there was also crepitation, and a marked friction sound could be heard posteriorly from the base to the angle of the scapula; the rub could be detected in front towards the right nipple. At the base of the right lung there was absence of respiratory murmur, but distant tubular breathing was audible in one or two parts. The left side was normal, and there was no disease about the heart. In the abdomen no enlargement of the liver existed, nor was there tenderness in the right hypochondrium. The pulse was compressible, the tongue clean. The patient had a good appetite, and was able to sit up and walk about the ward. He was ordered solution of acetate of ammonia, with small doses of morphia several times a day, and meat was allowed.

On the 24th there was less cough, but more pain in the right side. There was scarcely any expectoration; and even the scanty rusty sputum at first observed had almost ceased. The base of the right lung was dull on percussion, and distant tubular breathing and crackling could be heard. The countenance was cheerful, pulse quiet, and there was no dyspnœa; soon after coughing up the hydatid the patient stated that he felt a "splashing" sensation in the right hypochondrium, but that had now ceased. On the 28th he felt better, and in less pain, but there was greater fulness in the hepatic region. The physical signs in the chest remained unchanged.

On October 4th there was neither cough nor dyspnœa, and the patient desired to go home.

It rarely happens that the pathological history and causes of

disease are more clear than in this case; at the outset manifest enlargement of the liver existed; then, after a considerable interval, pain in the right side and the signs of pleuro-pneumomia came on, and the chest affection was shortly followed by the expectoration of a hydatid cyst. The symptoms rapidly subsided, and in four to five weeks the patient seemed to be in his usual health.

It would appear that the hydatid had for a considerable period ceased to enlarge, the tumour even lessened in size, at the same time adhesions formed on the opposed sides of the diaphragm; and although friction sound continued after admission, adhesions were sufficiently firm to prevent extravasation into the pleura, and the pleuritic changes were of a plastic kind. The lower lobe of the right lung was damaged, but the mischief was confined to that part, and the recovery of the lung would depend upon the cessation of the discharge of pus from the liver.

A fact of great interest connected with this case was the sudden subsidence of the symptoms, as if the diaphragmatic opening was valvular, and the effusion of pus from the old hydatid cyst had at once ceased. No elements of bile were found in the expectorated matters; there was no fetor of breath; still it would seem that some air had passed into the sac, so that a splashing sensation was felt by the patient. A further effusion of pus into the sac led to the disappearance of this "splashing" and to increased fulness in the right hypochondrium.

Some old hydatid cysts become very dense, and then contraction only takes place very slowly, and such a cyst would probably be found in this instance. It may be that the pus may cease to be formed, and the cyst slowly diminish in size, but more probably after a time a second discharge will take place through the lung, and may be more persistent in character.

When the hydatid cyst exists near to the convex surface of the liver, and enlarges directly upwards towards the diaphragm, the diagnosis is more difficult than where a tumour can be felt from the anterior surface of the abdomen; in these former cases the liver seems to be generally enlarged, there is uniform dulness, the lower margin is felt, and no inequality can be detected on the surface. There may be the absence of

general disturbance of the health inconsistent with structural disease of the liver, but this alone would not suffice to establish a certain diagnosis. The instance before us was probably mistaken for abscess in the liver, and the residence in India might the more easily have given rise to such a supposition.

CASE 3.—*Hydatid in the Spleen; Relief by Tapping; Subsequent Suppuration of the Cyst; Perforation into the Peritoneum.*[1]

(Reported by Mr. L. CARRÉ.)

Henry J. S—, æt. 38, was admitted into Guy's Hospital, June 19, 1867, under Dr. Habershon's care; he was a single man, of healthy appearance, dark complexion, and by trade a shoemaker. For eight years he had had pain in the left side, which commenced in the abdomen, and extended to the loins and upwards into the axilla. When first noticed two years before admission the tumour was about the size of a walnut; it was situated about two inches above the umbilicus, and gradually increased in size. The patient stated that four years previously he lifted his father, who was an invalid, and felt "something give way" about an inch below the end of the ninth rib, and that he afterwards felt very faint. The tumour continued to become larger till it interfered with his walking, and his respiration became shorter. On admission there was a prominent globular mass, elastic to the touch, and reaching from about two inches on the left of the umbilicus round to the spine of the fifth rib, as far as the crest of the ilium. There was an indistinct sense of fluctuation on placing one hand over the left kidney and tapping with the other on the tumour in front of the abdomen. The pain came on at irregular intervals; it was very severe in character, and had increased of late; there was a constant feeling of heat and a dull pain. After taking food the pain increased, and, to use his own words, "the food seemed to go down behind the tumour and cause pain; the pain was also aggravated on making any attempt to pass urine; there was some dyspnœa. Pressure on the tumour,

[1] An abstract of this case was published in the 'Reports' of 1868, by Dr. Hilton Fagge.

or percussion, induced pain. The appetite was good, pulse 60, full, the tongue clean, the bowels regular. He was ordered quinine mixture, magnesia medicine to act on the bowels, and a meat diet. On July 2nd the tumour was more prominent and tender. Mr. Bryant introduced a small trochar into the tumour, and drew off thirty-seven ounces of clear fluid; it was free from albumen. Dr. Fagge detected in the sediment from the fluid the head of an echinococus, surrounded by a row of hooklets. The patient did not suffer pain from the operation; the whole of the fluid was not drawn off, and a compress of lint was applied with a broad strip of plaster. The relief afforded by the operation was transient, for on the 6th pain returned, but was relieved by opium; the size of the tumour was greatly lessened. On Aug. 10th the cyst was found to be refilling; the breathing became affected, so that he suffered a good deal on making any exertion. On October 1st, however, he left the hospital much relieved. On December 18th he was again admitted into clinical ward under Dr. Habershon's care; the tumour then occupied the left lumbar and hypochondriac regions, and extended into the umbilical region, pressing upwards the diaphragm and also the left lung. The tumour was elastic, but distinct fluctuation could not be felt. The lower ribs on the left side were pressed outwards; the circumference of the body, $1\frac{1}{2}$ inch above the umbilicus, was 38 inches, $19\frac{1}{2}$ on the left side, $18\frac{1}{2}$ on the right side. The surface was tender over the tumour, and especially around the left nipple. A prominent ridge passed from three inches below the ensiform cartilage to the crest of the left ilium. The dulness commenced at the level of the seventh rib, but there was at times a slight resonance midway between the umbilicus and left nipple, as if the bowel passed in front of the tumour.

On March 3rd Mr. Bryant passed a large trochar, and drew off five pints of fluid. This was of a yellowish colour, turbid, neutral to test-paper; small crystals of cholesterine floated on the surface; its specific gravity was 1022; it gave faint green and slightly violet colours with nitric acid, and it contained a large quantity of albumen, becoming nearly solid by heat. A number of small hydatid cysts came through the canula, most of them perfect; a few were broken. They were about the size of small peas and in number 200 to 300. A few scolices

were found, and hooklets were discovered in the sediment. A metal tube six inches in length was tied in the cyst, and the fluid allowed to drain off. On March 4th he had passed a bad night, the pain being severe, especially about the angle of the scapula; there was pain on deep inspiration. Rigors had occurred in the morning; pulse 120, respiration 40, temperature 104·4, the tongue dry and fissured. About a pint of fluid drained away the day after the operation; there was considerable tenderness around the canula and about the left side of the chest. On the 5th the tongue was dry and brown, the temperature 103·2°. On the 9th the temperature was lower, 101·2°, and the pulse less frequent, 90; but there was tenderness over the whole abdomen and on the left side of the chest. There were fresh rigors. The patient appeared pale and anxious. The smell of the discharge was offensive, and was relieved by carbolic acid. On the 12th, while coughing, some thick greenish fetid discharge was expelled, and afterwards a quantity of hydatid membrane. The cyst was washed out with dilute solution of carbolic acid (2 grains to 4 oz.). On the 13th, during the action of the bowels, more hydatid membrane was expelled. The metal tube was changed for a vulcanised india rubber one, and the cyst was washed out every day with the solution of carbolic acid, and on the 21st twice a day. On April 6th there was less discharge, but the patient suffered from rigors and vomiting, and from great pain. The tongue was dry and brown, the abdomen was tender; there was hiccough and cold sweats. On April 7th a small slough was withdrawn with the canula. On April 11th there was diarrhœa; the discharge was of a blackish-green colour. On the 26th, at 9 p.m., he got on the night stool, but fainted and fell on his hands and knees; he became cold, had rigors, and complained much of pain in the abdomen; at 4 a.m. he moaned a good deal, but it was said "not to be more than usual;" at 5 a.m. he died quietly. Inspection was made on April 27th, by Dr. Moxon. The brain was healthy; at the base of the left lung there were old adhesions uniting the diaphragmatic pleural surfaces. The fistulous opening on the left side of the abdominal parietes extended for a distance of four inches, and terminated in the abscess of the spleen. The inner end was obstructed by a shred of clear hydatid, and

other shreds were present. The channel was about an inch in circumference, and it was lined by a well-marked membrane; its track was obliquely through the abdominal wall, then through the omentum between the liver and the stomach into the spleen, all the organs being matted together, and the omentum curiously turned upwards from the stomach to overlie the end of the spleen. The spleen pushed up the diaphragm, and it had exerted much pressure on the left lobe of the liver, leading to absorption of the gland to two thirds of its extent. The stomach was placed on the right, and directed forwards by the abscess in the spleen, which opened into the sac of the lesser omentum. The upper two thirds of the left kidney were behind the tumour; there was no change in the capsule, except that the vessels appeared varicose. The colon was in its natural position below the spleen, but it was bound down, and on attempting to separate it from the tumour a collection of discoloured pus was found to extend from the abscess; the walls of the bowels were, however, not implicated. Another portion of the abscess reached the origin of the eleventh rib, near to the diaphragm. The abscess of the spleen was bounded by a well-formed pyogenic membrane, splenic tissue surrounded it, except at the part where an opening had been made. An opening about an inch in diameter, at the posterior part, led directly into the sac of the lesser omentum, which resembled an abscess, lined by pyogenic membrane; the contents were brown fetid matter as in the spleen abscess. The foramen of Winslow was closed. The stomach rested upon the peritoneal abscess; its mucous membrane was pale, and coated with tenacious mucus. The stomach was united to the transverse colon by thickened omentum; the transverse colon also appeared thickened and shortened. The abscess in the lesser omentum had apparently existed for some time.

The diagnosis of this case was for a time obscure, for, although a large cyst was recognised, and after a puncture had been made, the hydatid character of the disease was made out, still, it was doubtful whether the mischief was located in the kidney or in the spleen, or in the left lobe of the liver. The tumour extended too far into the left loin and into the left hypochondriac region for it to be the left lobe of the liver; but it was more difficult to ascertain whether the kidney or the

spleen were affected. The most prominent part of the tumour was directly over the seat of the left kidney, and the dulness in the left hypochondrium might be explained by the spleen being adherent and pushed upwards; the absence of all renal and vesical irritation militated against such an opinion. Considerable doubt, however, remained; and on his second admission the purulent contents not only presented cholesterine, but with nitric acid there was a faint play of colours to green and violet, suggesting the idea of bile constituents being present, and the left lobe of the liver being the part implicated. The tapping of the cyst afforded considerable relief, and the patient left the hospital apparently convalescent; in a few months, however, the cyst refilled, inflammatory changes took place, albuminous product was effused, and cholesterine and afterwards sloughing took place in the walls of the cyst. An abscess formed and extended to the sac of the lesser omentum; the symptoms were those of progressive exhaustion arising from the extent of the abscess and the fœtid character of the discharge; and, although the fatal termination was hastened by the patient very improperly getting from his bed, and thereby inducing syncope, still there was no power of withstanding such extensive degenerative and sloughing process. If the cyst had been re-emptied at an early period, before such severe mischief had been induced, the original cyst would probably have contracted, and the patient have completely recovered. With cessation of pain and distress, and especially after an operation had been performed with success, patients are often very unwilling to bear a longer continuance under treatment, and thereby cause such delay in the subsequent conduct of the case as may result in their own irreparable injury. Under the circumstances of extensive suppuration and sloughing the only chance of relief consisted in opening the cyst, and in washing it out with antiseptic fluids.

Case 4.—*Old Hydatid Cyst in the Liver; Enlargement of the Liver; Jaundice; Perforation of the Diaphragm; Pleurisy.*

(Reported by Mr. R. H. Clunn.)

Mary N—, æt. 47, a single woman, by occupation a

teacher of music, was admitted into Guy's Hospital, under Dr. Habershon's care, on November 21st, 1872. She had never been strong, and from a child had been subject to occasional attacks of nausea and vomiting, accompanied with headache and giddiness; these attacks would last for one or two weeks. Ten years ago she was knocked down and run over by a horse and chaise, her head was injured, and she had erysipelas; she was ill for four or five months. Five years ago she felt ill and weak for a few days; she lost her appetite, and had vomiting and severe headache. Jaundice then appeared. These symptoms slowly passed off, but she had sickness and nausea as before. The sickness was often increased on taking food, and was usually worse about her monthly periods. Nine weeks before admission she again lost strength and her appetite failed, but she did not feel ill enough to remain in bed. There was no pain at that time, but two or three weeks later, about six weeks ago, on getting up in the morning she found that her skin had become yellow, and she felt pain in the middle of the back and on the right side; the pain gradually increased, and a few days later was felt also in the region of the stomach. The pain was usually of a gnawing, sometimes of a shooting character, and was generally worse at night. For the first three weeks she was afraid to take solid food on account of the severity of the nausea, but she only vomited three or four times. The vomited matters were dark, although not as deep in colour as coffee grounds. For the last fortnight the nausea had persisted, but the bowels were much confined, one or two dark motions were passed. A month ago there had been rigor, but not subsequently. Turpentine stupes had relieved the pain in the side. Menstruation had ceased for two months. Her family history was not good; her father had died from mania, a brother and sister were inmates of an asylum, and a brother had died from phthisis. On admission the patient had an emaciated and melancholic appearance, there was a lightly jaundiced tinge of the skin, the tongue was very red, but moist. The chest was flattened at the sides, the sternum prominent. The left lung expanded at the apex better than the right, the resonance on the left side was good, but the respiration was harsh. On the right side posteriorly the lung was not found to expand during respira-

tion, and a very distinct grating sound could be felt by the hand placed on the lower ribs; this friction sound could be felt and heard over an oval space, about five inches long by three inches wide, extending upwards from the eleventh rib. There was dulness at the same part, but the dulness extended to the angle of the scapula, and at the part *above* the friction sound there was bronchial breathing and ægophony. The pulse was 104, resp. 30, temp. 99°. The abdomen was rounded and tense, there was much flatulent distension, but the hepatic dulness was increased, and the liver could be felt extending to about an inch above the umbilicus. The space between this point and the ensiform cartilage was occupied by a rounded swelling, whose centre was slightly to the right of the middle line; this reached the ribs on either side; the swelling was soft, but non-elastic, and no fluctuation could be detected; the pain was felt at the part. The urine was of sp. gr. 1030, free from albumen. The feet were œdematous. Magnesia mixture was given to act on the bowels, and afterwards quinine. On the 27th the pulse was 96, the resp. 26, the temp. 98·4°. The pain in the right side was severe at night; it came on suddenly, and lasted usually for some hours, ceasing also suddenly. The friction sound lessened, but the evidence of effusion above that part was very marked. Opium was given to relieve pain. The patient improved, the abdomen became less tense, and the pain less severe.

On December 24th she was in severe pain and more prostrate. The following day she became much worse, vomiting came on, and she sank on the 26th.

Inspection was made on the 27th. The left side of the chest was free from disease, but on the right side there was serous effusion in the pleura at the upper part, compressing the lung, but limited by adhesions at the lower part of the lung. Over the lower lobe were loose fibroid bands which had produced the friction sound; soft albuminous product was very abundant. The lung was much compressed. The heart was small and healthy. The liver was enlarged; it was congested and fatty, and there was a cyst reaching to the surface of the abdomen, and occupying the position of the left lobe of the liver; a thin stratum of gland structure was detected on its lower border. This cyst contained pus, it had

dense stratified walls, like an old hydatid cyst; but Mr. Goodhart, after careful examination, could not detect any hooklet or hydatid structure; there was some pus in the sac; at the upper part a rounded opening extended through the diaphragm into the right pleura. The stomach was healthy, so also the gall bladder and other abdominal viscera.

This case was one of great interest, but the diagnosis was very obscure. It was evident that the liver had for some years been subject to disturbance, and that the bile ducts had been for a time at least partially obstructed; the liver was found to be enlarged, the patient was cachectic and emaciated, and there was evidence of pleurisy on the right side. The pleurisy was peculiar, for there was albuminous product effused at the lower part, producing very loud friction sound, whilst at the centre of the lung was pleuritic serous effusion, as shown by dulness, tubular breathing, and ægophony. There was no cough, and no marked elevation of temperature. The history of the case pointed to disease commencing in the liver and extending to the pleura, but no evidence of tumour could be found. The rounded swelling at the scrobiculus cordis suggested the idea of hydatid, but the absence of elasticity and the wasted appearance of the patient were apparently opposed to such an idea. The symptoms of pleurisy had not come on very suddenly, neither had there been any urgent dyspnœa. The perforation of the hydatid cyst had been very gradual; the cyst itself was old, degenerative changes had taken place, ulceration slowly extended through the diaphragm, but when the pleura was reached the mischief was localised, and fibrinous effusion limited the disease. The tension of the cyst was thus removed, and the elasticity of hydatid tumour was absent; still there was dulness on percussion, and no air was present in the cyst; the distension of the cyst lessened, and it was thought that œdema of the parietes of the abdomen had perhaps caused the rounded appearance; the distension was *really* lessened because the fluid contents had in part escaped. For a time, after perfect rest, the symptoms abated, the patient became cheerful, and was able to sit up. It is probable that fresh fluid escaping into the pleura induced new inflammatory action and consequent exhaustion. Opening the cyst would

have been a very doubtful proceeding, and would probably have hastened death, for degenerative changes would have been more rapid. The perforation of the diaphragm from hydatid in the liver happily leads in many cases to firm pleuritic adhesion, so that no extravasation is permitted, the lung is perforated, and recovery may take place as in the Case No. 2; but, if no adhesion form, the perforation causes intense and speedily fatal pleurisy. The treatment in this case consisted in relieving pain, in gently acting on the bowels, and in sustaining the patient as far as possible.

The unfavorable termination of most of the instances now recorded indicates the danger that arises from inflammatory changes in hydatid cysts; and if the diagnosis be clear it is a safer plan to withdraw the fluid early than to trust to the possible death of the hydatid and gradual wasting of the cyst, although it is true that the post-mortem table often reveals old hydatid cysts which have not produced any recognisable symptoms during life, nor have at all shortened its duration; and, in cases also where there is the refilling of a cyst after tapping, it would seem to be a wiser plan to re-empty the cyst early than to allow suppurative changes to ensue by the indefinite postponement of a second operation.

DESCRIPTION OF PLATE

Illustrating Dr. Habershon's paper on Cases of Hydatid Disease.

Fig. 1 represents the lower lobe of the lung in Case 1, containing the contracting cavity from which the hydatid had been expelled. The part is laid open, so as to show both halves of the section, which are respectively entitled *A* and *B*.

a, a′ are the two halves of the cavity.

b is a large bronchial tube, opening directly into the cavity.

c is a probe passing into a small aperture, through which the hydatid cavity communicates directly with the pulmonary varix, displayed in fig. 2. (It is to be noted that the artist has erroneously represented this aperture as continuous by a grooved channel with the open extremity of the bronchial tube. No such channel exists in the preparation.)

d, d, d, are scattered groups of tubercles. At *d′* these are calcified.

„ 2 represents the other surface of the section of lung marked *A* in fig. 1.

c′ is the other end of the probe marked *c* in fig. 1, passing from the hydatid cavity into the pulmonary varix, which is seen to form a cylindrical tube, abutting by a broad extremity on the surface of the lung.

e is a branch of the pulmonary artery, of considerable size, the ramifications of which have been laid open, and were found not to communicate in any way with the hydatid cavity.

„ 3 represents a portion of hydatid membrane, expectorated while the patient was attending as an out-patient under Dr. Moxon's care.

The specimens represented in these figures are preserved in the Museum of Guy's Hospital.

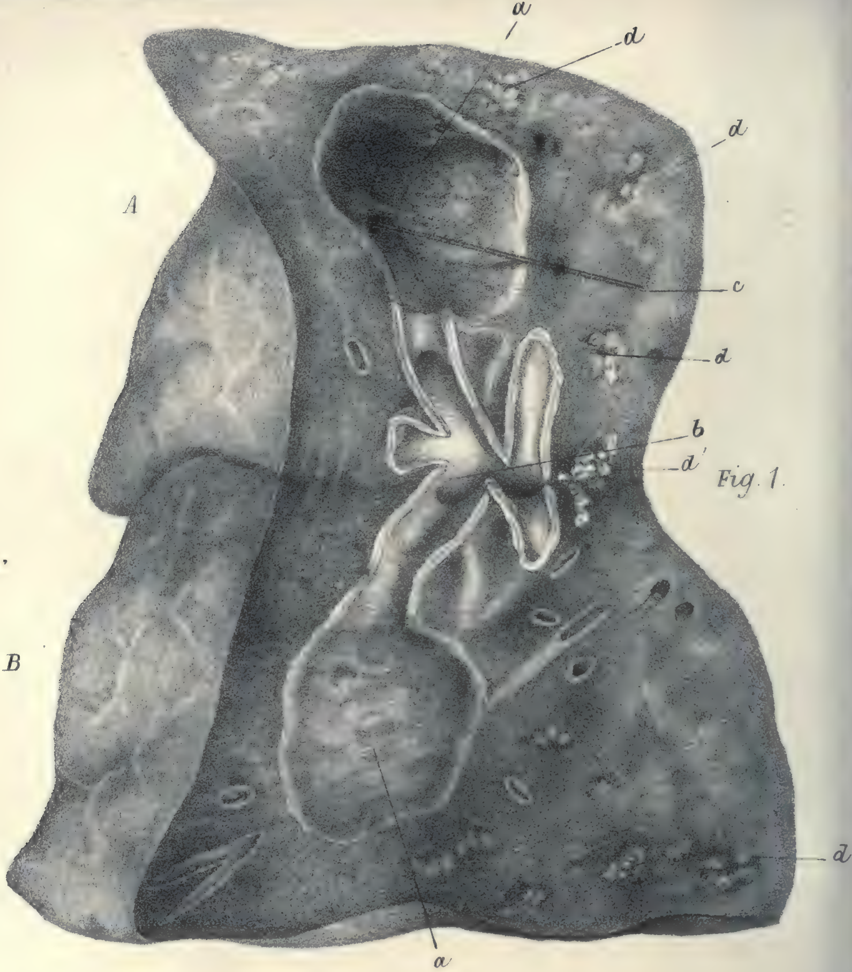

Fig. 1.

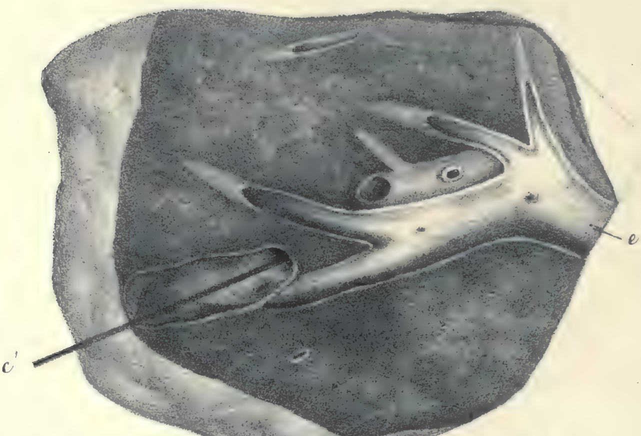

Fig. 2.

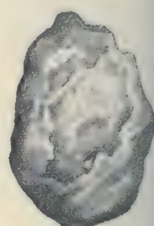
Fig. 3.

W Hurst lith.   M&N H

NOTES OF

ABNORMALITIES OBSERVED IN THE DISSECTING-ROOM

FROM OCTOBER, 1870, TO JUNE, 1872.

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AND

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From October, 1870, to June, 1872, more than 160 subjects have been dissected in our medical school. The following paper contains a short account of the more striking abnormalities observed. Our record is necessarily far from complete, as many of the slighter variations altogether escape notice, or when seen are so far injured by dissection that an accurate description of them is impossible.

The only abnormality of the osseous system observed was in the body of a negro. The lower four inches of the left tibia and fibula were fused together so as to form a single bone.

In the pterygo-maxillary region some fleshy fibres are not unfrequently seen passing transversely across the space beneath the external pterygoid muscle. In one subject we found on both sides a broad muscular band, extending from the posterior border of the external pterygoid plate to the internal lateral

ligament and the spine of the sphenoid bone. It lay beneath the inferior maxillary nerve and middle meningeal artery and upon the chorda tympani. This muscle occupies the same position as the plate of bone which is often found stretching between the spine of the sphenoid and the posterior border of the external plate of the pterygoid process.

We have noticed many instances of the second stylo-hyoid muscle descending under cover of the hyoglossus to the lesser cornu of the hyoid bone. Once we found a second stylo-pharyngeus passing behind the middle constrictor to an insertion on the pharynx.

In another subject on both sides a well-marked tendinous intersection two inches below the mastoid attachment of the sterno-mastoid, and upon its external aspect, gave origin to a fasciculus as thick as the stylo-hyoid. This passed upwards, inwards, and forwards beneath the digastric and stylo-hyoid muscles and the external carotid artery, and on one side it pierced the stylo-pharyngeus and then lost itself upon the pharynx. Its termination upon the other side was not observed.

In the submaxillary region we have noted one remarkable variation. On both sides a muscular slip a sixth of an inch thick arose from the lower border of the inferior maxilla on its inner aspect, nearly an inch in front of the angle, and then passed across the submaxillary gland in a direction parallel to the posterior belly of the digastric. On the left side it ended beneath the anterior belly of the left digastric in an aponeurosis, of which part crossed the middle line to join the slip of the opposite side, part ascended under the digastric to be inserted into the lower jaw at the symphysis. On the right side the digastric had no anterior belly, but terminated in the great cornu of the hyoid bone; while the muscular slip ended, partly in the aponeurosis above mentioned, partly in a few fibres which went up to the lower jaw by the side of the left digastric, but chiefly in a tendinous arch which crossed the middle line three fourths of an inch above the hyoid bone to join the tendon of the left digastric. Below this arch the mylo-hyoid muscle was visible; above it was concealed by the left digastric with the aponeurosis and fibres of these supplementary muscles. The slip of the right side was also connected by a band of fascia

with the hyoid bone at the junction of the great cornu and body.

Some instances of a clavicular attachment of the omo-hyoid have been noted. In one case, in addition to a normal omo-hyoid, a band more than half an inch broad arose from the clavicle beneath the sterno-mastoid, and ascended to the great cornu and body of the hyoid bone, covering its two superficial depressors.

The trapezius varies much in the extent of its attachment to the clavicle. In several subjects we have seen a separate muscular band, which leaving its anterior border, crossed the posterior triangle to be inserted into the clavicle beneath the sterno-mastoid. In some cases the descending branches of the superficial cervical plexus appeared from beneath an arch formed by this double insertion.

A small muscle was once seen descending from the transverse processes of the upper cervical vertebræ, in front of the levator anguli scapulæ, to the clavicle near the insertion of the trapezius (levator claviculæ). A slip was also once seen passing from the posterior border of the levator anguli scapulæ to the surface of the serratus posticus superior and the spines of the first and second dorsal vertebræ.

A singular variation of the rhomboidei was noticed in a body in which there was a considerable lateral curvature of the spine, the lower cervical vertebræ being convex to the left and the upper dorsal vertebræ to the right side. On the left side there was no rhomboideus major, while the minor was larger and thicker than that of the right side, and had a rather more extensive origin. On the right side the muscles were normal.

In one subject a second rectus capitis posticus minor was observed to the outer side of the normal muscle; in another this muscle was entirely absent on one side.

We have met with several well-marked examples of both the rectus sternalis and supra-costalis. In three subjects a muscle was seen to pass from the first costal cartilage to the scapula. In one a tendon arose behind that of the subclavius, and, becoming fleshy, passed in front of the brachial plexus and behind the supra-scapular artery to the upper border of the scapula, where its attachment lay in front of the omo-hyoid. In the second the subclavius was inserted on the left side into the

conoid and transverse ligaments, and, blending with the omo-hyoid, into the scapula. On the right side it was separate from the omo-hyoid, and inserted only into the conoid ligament and the base of the coracoid process. In the third the subclavius was attached to the transverse ligament and the upper border of the scapula behind the notch.

Muscular fasciculi are frequently given off by the edges of the pectoralis major and latissimus dorsi.* One of these was so complicated as to deserve more notice. A tendinous arch crossed the axillary vessels from the latissimus dorsi to the tendon of the pectoralis major, and was joined near the former muscle by a fleshy band, which arose from the lower border of the pectoralis major.

Once the clavicular origin of the pectoralis major occupied three fourths of the border of that bone, forming externally a thin layer, which overlapped the deltoid and concealed the cephalic vein and the accompanying branch of the acromio-thoracic artery.

In one case the pectoralis minor was found on both sides, partly inserted, as usual, into the coracoid process, partly continued by a tendon a quarter of an inch thick, which grooved the upper surface of this process, and then joined the supraspinatus. In another case the two muscles of this name arose from the second, third, and fourth ribs.

We have observed several instances of muscles inserted into the shaft of the humerus behind the latissimus dorsi tendon, and arising either from the coracoid process or the fibrous structures connected with the shoulder-joint.

In the deltoid of one subject a peculiar arrangement of transverse fibres was seen. These were divided into two portions, one of which formed a thick bundle lying deeply in the muscle. It arose from the acromial end of the clavicle, lay in front of and parallel to its anterior border, and was inserted into the tip of the acromion process. Superficial to this was a thinner band of fibres, which arose from the clavicle in common with some of the anterior fibres of the deltoid, and passed transversely outwards into its acromial fibres. Both extremities of the abnormal band were so covered by the superficial fibres of the deltoid that only a small portion, one inch transversely by half an inch vertically, was visible on the surface.

In a young and very muscular subject the serratus magnus had on each side additional heads of origin from the ninth and tenth ribs; these digitations had about half the breadth of the slips from the seventh and eighth ribs.

An equally extensive attachment of the serratus magnus was noticed in another case.

Beside the third head, so frequently found near the insertion of the coraco-brachialis, the biceps in one case had a fourth origin from the upper part of the outer lip of the bicipital groove. In another its long head arose from the lesser tuberosity of the humerus. Possibly this was the result of an accidental rupture. A variety closely allied to the third head consisted in a broad fleshy band arising from the middle of the inner border of the humerus, and passing across the vessels to the deep fascia just below the inner condyle.

In the forearm and hand abnormal connections between the muscles and the tendons have been very numerous.

A second palmaris longus was found ending in the fascia covering the ulnar artery at the radial side of the pisiform bone. Passing under the fascia was a fleshy belly, which arose by two tendons, one from the tendon of each palmaris, and was then inserted with the abductor minimi digiti into the first phalanx of the little finger. In another subject a palmaris longus arose from the lower end of the oblique line of the radius.

The flexor sublimis digitorum is often divided up to its origin. In a fœtus it was found in three portions, the most internal acting on the ring finger; the next, a thick fasciculus, arising from the internal condyle, becoming tendinous in the upper third of the forearm, and then again fleshy, and acting on the first and fourth fingers; the third part from the common tendon and the radius went to the forefinger.

In another subject the portion of the muscle which moved the first and fourth fingers arose only from the first and second heads. Three and a half inches below its origin was a tendinous intersection, as distinct as that of the digastric. The rest of the muscle was connected with the flexor longus pollicis by a fleshy band, which passed through the median nerve.

Under cover of the flexor carpi ulnaris we once found a thick flat muscle arising from the lower fourth of the posterior border

of the ulna. It became tendinous at the wrist, entered the palm on the radial side of the pisiform bone, and was inserted with the abductor minimi digiti.[1]

In one case the extensor minimi digiti was seen to take an additional origin from the back of the ulna, and the common extensor to send a tendon to the second phalanx of the thumb. In another subject a fleshy belly, three inches long, arose from the posterior border of the lower end of the radius, at the groove for the extensor communis digitorum, and was inserted with one of the dorsal interossei on the ulnar side of the middle finger. An extensor medii digiti was once noticed arising below that of the index finger. The fourth lumbricalis, in one instance, was found to be inserted into the ring finger on its ulnar side.

In the abdomen we have noted a singular variation of the external oblique. Beneath this muscle three muscular bands, each about one inch broad, arose, two by a double tendon from the tip of the twelfth rib, one from the eleventh rib. They passed downwards and forwards over the internal oblique, and were inserted from one to two inches behind the anterior superior spine of ilium. On the other side there were similar bands.[2]

We have also seen the posterior fibres of the same muscle becoming tendinous above and joining the lower digitation of the serratus posticus inferior.

A double origin to the transversus perinei was once noticed; part normally, the rest from the fascia lata covering the origin of the biceps and semi-tendinosus, so as to conceal a portion of the erector penis.

One subject, in which the adductors were large and well-developed, had an additional head to the adductor longus. This arose from the crest of the pubes as far outwards as the spine, and was separated by a cellular interval from the ordinary origin at the angle of the pubes.

Both quadrati femoris were absent in one body. The adductor magnus was of normal size; the gemelli were rather larger

[1] In the same arm were—(1) Third head of biceps. (2) Abductor pollicis arising partly from extensor ossis metacarpi. (3) Communicating slip from the belly of extensor carpi radialis longior to brevior. (4) Slip from extensor indicis to middle finger.

[2] A similar case was recorded in the sixteenth volume of these Reports, p. 149.

than usual. In another the quadratus was on one side very thin and narrow, on the other only represented by a bundle of tendinous fibres. In this subject the inferior gemellus was also absent, the pyriformis was divided, and the great sciatic nerve had split before leaving the pelvis. The quadratus femoris was also wanting on both sides of another body.

In the leg we have found large muscular bundles connected with the soleus and the deep posterior tibial muscles.

In one subject a muscle arose from the oblique line of the tibia and the deep surface of the soleus, and was inserted by tendon into the back of the os calcis, above and in front of the tendo Achillis, and also into the internal annular ligament.

On each side of another subject a muscle in connection above with the flexor longus pollicis was inserted into the os calcis, internal to and deeper than the origin of the musculus accessorius.

Two instances of a flexor longus accessorius were also seen; in one the lower fibres of the flexor longus pollicis united with fibres arising from the fascia over the flexor longus digitorum, and formed a tendon which joined the musculus accessorius, and was continued into the innermost tendon of the flexor perforans. The second muscle arose from the soleus at the lower end of its muscular portion, and, running into the sole of the foot, joined the inner side of the musculus accessorius.

In the same subject the slip of the flexor perforatus to the little toe was absent, but was represented by a small muscular bundle, lying on the tendon of the flexor perforans, from which it arose near the inner border of the foot. It ended in a tendon, which was inserted ino the second phalanx, and was split by the long flexor tendon in the usual manner.

This deficiency of the tendon to the little toe was supplied differently in another subject. A thin tendinous slip was given off from the under surface and outer side of the flexor longus tendon, opposite the sustentaculum tali. This became fleshy and was joined by a small muscular belly from the under and outer side of the flexor brevis digitorum, and was inserted into the second phalanx of the little toe by a small expansion which lay on the outer side of the long flexor tendon, and was not perforated by it.

A fifth slip was once noticed in the extensor brevis digitorum

between its tendons to the first and second toes. This ended in the transverse ligament, and sent fibres to the aponeurosis of each digit.

A large third head of the abductor pollicis was once seen arising from the long plantar ligament.

In the arterial system the abnormalities observed have been few, and most of them unimportant.

The left common carotid once arose from the innominate artery, half an inch from its origin. Only four examples of the thyroidea ima have been met with. A vertebral artery (left) was seen ascending from the arch of the aorta between the carotid and subclavian, and passing in front of the inferior thyroid artery. In one subject the superior laryngeal of the left side pierced the thyroid cartilage. In three cases the internal maxillary artery has been found beneath the inferior dental nerve; in one it was covered by all the third division of the fifth nerve.

Once a branch arose from the axillary, about the origin of the subscapular, ran down with the vessels to the lower border of the teres, then turned forwards and reached the chest at the lower end of the pectoralis major. In another subject the same part of the axillary gave off an artery, which crossed the middle of the subscapularis muscle to join the posterior scapular about the middle of the posterior border of the scapula.

We have notes of ten cases of an abnormal division of the brachial artery. In one the artery divided three quarters of an inch below the tendon of the teres major, and gave off the radial, which crossed the median nerve to reach its usual position. From the other trunk a small vas aberrans arose just above the elbow, and after a course of two inches and a half joined the ulnar. Between these two a branch of the musculo-cutaneous nerve passed to join the median.

In two cases the division occurred at the junction of the upper and middle thirds of the arm; in one case the radial artery separated and passed at once under the median nerve, in the other the smaller vessel crossed the larger trunk and the median nerve, but its further course was not observed.

Three times the brachial artery divided in the middle of the arm, giving off in one case the radial, which lay at first internal

to it, and then crossed the larger trunk; in another case the ulnar arose and supplied the anastomotica, the two profunda vessels taking origin in the axilla from a trunk common to them and the circumflex and subscapular arteries. In the third of this series the more superficial and smaller trunk divided again above the elbow-joint into a radial and ulnar. These were both of small size, and the latter reached its usual position by passing over the bicipital fascia, and the muscles arising from the internal condyle. The small size of these vessels was compensated for by a very large comes nervi mediani.

In the next case the division was one inch above the internal condyle, the ulnar lying superficial; in the eighth and ninth cases the divisions were respectively between the condyles and in the usual position; but in both the ulnar artery lay superficial to the muscles arising from the internal condyle, and the interosseous was supplied by the radial.

In another case the exact point of division was not noted, but it was higher than the bicipital fascia, under which the radial passed to gain its usual position in the forearm.

In two of the cases in which the ulnar artery lay superficial to the flexor muscles it was noticed that the palmaris longus muscle was absent.

The radialis indicis and princeps pollicis arose in one instance from a large superficialis volæ. In the same hand the ulnar profunda came off from the digital branch to the little finger.

In two subjects the right lobe of the liver was supplied by the superior mesenteric artery, in another a partial supply was given to the left lobe by the coronary. In one instance the colica media arose from the splenic artery. The right kidney was once seen receiving a small branch from the common iliac artery of that side. In another subject an artery equal to the spermatic in size arose from the right renal, and, after dividing, partly joined the aortic spermatic, which was normal, and partly ended in the fat, &c., below the kidney.

The right spermatic artery was once found arising from the aorta above the level of the renal arteries, passing behind the inferior vena cava, and curving over the right renal vein at its junction with the vena cava. The right spermatic has also been seen arising from a second renal artery.

The obturator artery was found to arise from the deep epi-

gastric twelve times. In one instance it is stated to have been close to Gimbernat's ligament.

The left external iliac divided in one subject half an inch above Poupart's ligament. The profunda lay on the inner side of the superficial femoral, between it and the vein, which bifurcated two inches lower. The profunda gave off the deep epigastric, the deep external pudic, and the internal circumflex. On the opposite side the artery divided an inch below Poupart's ligament, and its branches came off normally.

In another subject the external iliac beneath Poupart's ligament divided into three trunks, which lay for some distance side by side, the central one being somewhat larger than the other two. The outer supplied the circumflex ilii and external circumflex; the middle was the superficial femoral; and the inner crossed in front of the femoral vein, just above the junction of the long saphena vein, gave off the deep epigastric, and took the place of the profunda.

The deep external pudic was once seen arising from the deep epigastric, and running through the fork between the saphenous and femoral veins.

The only venous abnormality noted was a left renal vein passing beneath the aorta below the level of the renal artery, to which it was posterior at the hilus of the kidney. It received the left phrenic vein, which lay over the left renal artery.

The descendens noni has been again frequently seen arising from the pneumogastric. In one subject it received a branch from the spinal accessory, in another from the superior cervical ganglion. Both hypoglossal nerves of one subject gave small branches to the lower end of the stylo-hyoid muscle. In another the digastric muscle itself received a small supply from this source.

Once a descending branch of the superficial cervical plexus, after passing beneath the trapezius close to its clavicular insertion, pierced it one inch behind its margin, and then ascended, again crossing the posterior triangle. Its cutaneous distribution was between the small and great occipital nerves.

In one instance the supra-scapular nerve divided into two branches, one of which passed through the notch of the scapula, while the other perforated the bone just below it. The upper

division supplied the supra-spinatus, and joined the lower division. The united branches supplied again the supra-spinatus, together with the infra-spinatus and shoulder-joint. In another subject the subscapularis on both sides received filaments from this nerve. In more than one instance the external anterior thoracic has been found supplying the anterior border of the deltoid by a small branch accompanying the cephalic vein. The ulnar nerve passed in front of the inner condyle and the elbow-joint in an arm in which there was a high division of the brachial and a superficial ulnar artery. After twisting round the origin of the flexor muscles it perforated the flexor carpi ulnaris, and descended the forearm in its usual course. In another subject the same nerve was joined by a branch from the anterior interosseous, which crossed behind the ulnar artery, and could be traced in the ulnar nerve as far down as the lower fourth of the arm.

We have but few notes of abnormalities of the viscera.

In one subject the hepatic and cystic ducts joined to form the ductus communis choledochus half an inch from the opening into the duodenum.

On the left side of another subject two ureters were found opening below into the bladder by distinct orifices. Each was connected above with a separate pelvis, one at the upper, the other at the lower, part of a large kidney. On the right side the parts were normal.

A CASE OF

PROGRESSIVE CASEOUS DISEASE OF THE LYMPHATIC GLANDS

AFTER

DISEASE OF THE KNEE-JOINT.

By JAMES F. GOODHART, M.B.

The extension of tuberculosis in the lower animals from cheesy deposits which have been produced artificially has, perhaps, given a significance to similar products, however produced, in man, which did not previously attach to them. I say *perhaps,* because many pathologists seem still inclined to doubt the local origin of tuberculosis, and still would ascribe to diathesis conditions which those who have worked at experimental pathology are disposed to regard as consecutive, in many cases, to ordinary inflammatory processes. The cases adduced from post-mortem examinations have not tended towards the removal of scepticism on the point, since in most instances it has been open to question whether, in the absence of any positive connection between the supposed cause and its results, the caseous deposit and secondary tuberculosis were not, both of them, evidence of a pre-existing constitutional state.

The following case will not settle the controversy; but, taken for what it is worth as a single and most exceptional one, it does seem to me that it is one of the very few instances on record in which, precisely as in the lower animals, a tubercu-

losis has extended from a local cause in a manner so direct that it cannot be questioned.

But the report shall speak for itself.

Thomas F—, æt. 22, was admitted under the care of Mr. Forster, on November 16th, 1871, for disease of the right knee-joint.

He can give no history of consumption in his family. His mother has had rheumatic fever.

He was operated upon for cleft palate at thirteen years of age; but he has always been strong and hearty till two years ago, when his right knee-joint became stiff. He was soon unable to bend it, and the knee began to swell; but he had never apparently had any acute symptoms, and he had walked about till three months before his admission. He has had a cough latterly, and spat up some blood a month ago.

His condition when admitted need not be described; suffice it to say that he was an unhealthy-looking man, with sallow, pasty complexion, and with a large mass of glands behind the right sterno-mastoid. His lungs also gave indications of disease of some standing, though not of any recent or active mischief.

There being advanced disease of the right knee with much pain, the limb was amputated through the thigh, and the patient died twenty-three days after.

The joint was in a state of pulpy disease, the tissues being all gelatinous and the cartilages eroded. Over the internal condyle of the femur and the corresponding surface of the head of the tibia the cartilage was of a dull yellow colour, and on making a vertical section of the bones this patch was found continuous with a well-defined area of similar colour in the cancellous structure of the condyle. The medullary canal was also filled up by yellow material, which microscopically appeared to be made up chiefly of fat-granules and lymph, all undergoing fatty changes.

Subjoined is Dr. Hilton Fagge's report of the post-mortem examination, with which I have incorporated a few notes of my own.

Disease of knee and of lymphatic glands of groin, abdomen, chest, axilla, neck; extension of cheesy formation into lung from its root; miliary tubercle.

Cervical glands considerably enlarged, and containing cheesy material, but some of the formation in them was comparatively recent and gelatinous in appearance.

The glands about the root of the lungs were extremely enlarged, some more than an inch long, presenting a very curious marbled appearance with black masses of pigment, contrasting with the yellow parts.

It was curious that these glands should contain so much pigment, for the lungs generally were pale. Another very remarkable appearance in the left lung was that in its concave surface, at the level of the root, were numerous masses of cheesy material, which looked very much as if they had been formed by extension of disease from the glands at the root. These masses had a flat surface turned to the pleura as big as shillings, and, perhaps, of a quarter of an inch maximum thickness. The left lung also contained immense numbers of minute grey miliary tubercles, which could be felt better than seen, scattered all over it. Similar tubercles, but less numerous, existed in the right lung. At the apex of the left lung was a little old phthisis, semicretified; but this was very little in comparison to the disease above described, situated in front of the root of the lung.

Liver apparently healthy.

Spleen large, but not soft.

The glands in Scarpa's triangle, on the right (diseased) side, were large, yellow, and softening down into a putty-like consistence. Those in the right groin were firm, of yellow colour, and very large. The same change also existed in the glands along the psoas muscle on this side, and in the lumbar glands as far as and into the portal fissure, where were some as large as good-sized chestnuts. The mesenteric glands were not affected, neither were those of the left groin or left lumbar region. The axillary glands on right side and those on both sides of the neck, were also in an hypertrophied and caseous condition.

ON

SUPPURATION AND SPHACELUS OF THE TOOTH-PULP.

By S. J. A. SALTER, M.B., F.R.S.

The formation of pus in the tooth-pulp is one of its commonest morbid changes, and happens much more frequently than is generally imagined. It may occur to any extent, from a minute development of matter in a circumscribed area of the pulp to the complete suppuration and sphacelus of the whole organ. This destructive purulent inflammation of the pulp is the usual commencement of alveolar abscess, and where the latter is associated with dental caries and an unopened pulp-chamber I believe it always thus arises. But alveolar abscess *may* occur without suppuration of the pulp, and the pulp *may* suppurate without the discharge finding an exit.

The phenomena of tooth-pulp suppuration are parallel in all essential respects to suppuration in other organs, and the two conditions in which the matter is pent up, or freely discharged, have respectively the same distinctive and characteristic symptoms. A circumstance, however, which gives an especial exaltation to one of the symptoms, namely, *pain*, is that the pulp is peculiarly sensitive from its profuse supply of nerves, and that it is boxed up in a perfectly unyielding case—the tooth-walls. Suppuration of the tooth-pulp is usually of the same character as suppurations generally of internal structures: it is attended with a certain amount of destruction—sphacelus, of the structure itself. When the tooth-pulp, however, is ex-

posed, especially if the exposure be gradual and effected without acute inflammation during its production, the pus-formation is superficial (as from granulating surfaces or mucous membranes), is unaccompanied by deep or general lesion of substance, or the attendant symptoms of such a change.

In many cases where there is no absolute proof of the existence of pus in the pulp, where the tooth has been retained and so could not be examined, one is nevertheless justified in inferring the presence of matter, by analogy.

I have so very frequently found pus in small quantities in the pulps of teeth only slightly diseased, and which have given rise to very moderate symptoms, that I am certain it is very frequently developed without being suspected, the tooth recovering from its painful condition, and being retained for a long series of years subsequently as a useful and apparently a sound organ.

Thus, one person, who is impatient of pain, insists on having a tooth extracted, though apparently but little diseased. Pus is found in the pulp. In a similar case the patient prefers to attempt the saving of the tooth. The painful symptoms pass off by degrees, and although the anatomical condition cannot then be displayed, I am confident, in many such cases, that pus has existed. As will be shown hereafter, the subsequent examination of teeth, that have been thus affected before, corroborates such a view.

In considering the pathology of the teeth it must always be remembered that they have two sources of vitality—the periodontal membrane as well as the pulp, and that the latter may undergo the severest destructive changes without destroying the life of the tooth. This is conspicuously true as regards the plasmic circulation in the tooth-fangs. I believe it is equally so in reference to the sensibility of the whole dentine. I am certain that, after the destruction of the pulp, portions of the crown of the dentine have been sensitive to mechanical violence.[1]

I have been for many years in the habit of examining the pulps of a large proportion of the teeth I extract, and, having a microscope always set up and at hand, I have with great facility made a large number of such examinations.

[1] "On the Anatomy of the Dentinal Tubes," by the Author. Truman's 'Archives of Dentistry,' 1865.

The best way to get at the pulp is to crush the tooth in a vice. I first envelope it in a piece of calico, and then, placing it in a vice, slowly and carefully compress it till the walls give way. The calico keeps the parts sufficiently *in sitû*, and one can examine the pulp and its relation to exterior disease quite satisfactorily.

When a tooth-pulp undergoes irritation, if of slight extent, the change which takes place in it consists of a general scattered calcification through its structure,[1] the formation of numerous islands of dentine. When, however, the inflammation is more severe, pus readily forms in the substance of the pulp and its tissues rapidly liquefy, while (if the pulp-chamber be still closed) the matter frequently progresses rapidly to the apex of the fang, and finds its way to the surface, still increasing in quantity, in the form of an "alveolar abscess." This process is attended by some interesting changes at the end of the fang, considerable absorption of bone around it, and the development of a mass of lymph, forming at first a sac, and ultimately, as bone absorbs and the pus advances to the surface, a fibrous cylindrical canal, through which the matter escapes.

If a tooth be examined in which these morbid changes are fairly established, and while the pulp-chamber is still unopened by disease, a portion of the pulp-cavity, often considerable, will be found filled with liquid yellow pus—to the eye apparently pure and quite liquid, while another portion of the cavity is occupied by healthy pulp, perhaps a little extra-vascular, but exhibiting no other change. The point which separates the pus from the healthy pulp displays a very interesting condition.

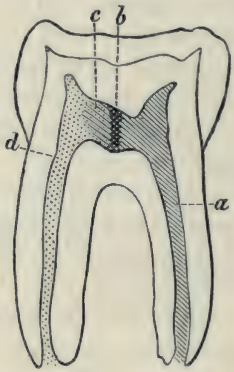
The healthy tissue may be traced up to a certain point, where it ends, more or less suddenly, in a deep red demarcation or patch. This is succeeded by a mass of diffluent slough, of a dirty greenish colour, beyond which is the yellow liquid pus. The interval between the pus and the healthy tissue is often very narrow, and is occupied by but a small amount of structure.

The following descriptions and ffgures are taken from examples that I have recorded in my note-book at different times.

[1] "Intrinsic Calcification of the Tooth-Pulp," by the Author. 'Guy's Hospital Reports,' vol. ix.

The first illustration is a diagrammatic representation of a tooth in this condition, and as it was extracted from my own mouth I am the better qualified to describe its history. The tooth was carions on one side of the crown, but the pulp-cavity was still unopened, though the dentine was softened and discoloured to the interior. The tooth had been for some days slightly painful, a little loose, very tender, and susceptible to changes of temperature. Then occurred one day and night of acute suffering. On extracting the tooth it was found that the apex of one root was blood-pointed, marking a vascular orifice; the other was sealed up by a mass of half-organized lymph. Upon examining the pulp-chamber, about one half of the pulp

FIG. 1.



was found in a healthy condition (*a*), occupying one fang and nearly half the central chamber. The other fang and a small part of the central chamber were filled with liquid pus (*d*); then occurred a mass of green diffluent slough (*c*), separated from the healthy tissue by a distinct band of a deep blood-red colour (*b*). The pus in the posterior fang was, as yet, quite shut in by the lymph around its apex.

The second diagram represents the condition of a lower molar. This tooth was carious on the posterior part of the crown, but the cavity had not opened the pulp-chamber. The posterior fang, the whole of the central chamber, and about half the anterior fang, were filled with pus. In the anterior fang was a small isolated collection of pus; above, below, and around this was some healthy pulp, but the structure in imme-

diate contact with the matter was in a state of slough, as is always the case, and the healthy pulp was limited by a deep red outline, as is equally constant.

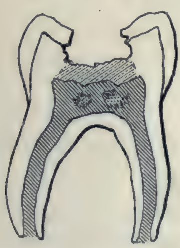
One other point, which is very general though not absolutely constant, is that the suppuration evidently commenced and was most advanced at that part of the pulp nearest to the dentinal caries. The extremity of the fang, which was wholly filled with

Fig. 2.

pus, was surrounded by lymph, with a pus-canal in its centre, the matter being conducted by it and in progress to the surface, which, however, had not been reached. The extremity of the other fang was simply surrounded by half-organized lymph, in which suppuration had not yet commenced.

A third specimen examined was an inferior second temporary molar. There was a large carious cavity on the top of the

Fig. 3.



crown; the central chamber was not opened, but the dentine above it was in an advanced state of caries. In the pulp of the

central chamber were some minute drops of pus, isolated here and there, and surrounded by dark red walls, and an amount of sphacelus that was but just appreciable. This is a condition that I have frequently seen in carious temporary teeth, even where they have been but slightly painful, and I suspect it is very common indeed.

The examination of these suppurating and sloughing pulps with the microscope discloses a curious and interesting condition as regards the smaller blood-vessels where the healthy tissue is limited. The deep blood-red band which I have described is occasioned by the dilatation of the vessels into ampullæ filled with clots. They form the limit of the circulation, and the dilatations are doubtless produced by the lost vitality of the vessels upon the margin of the slough; the vital contractility has ceased, and the force of the blood-current dilates the thin walls, which passively yield, and the blood coagulates. Probably the same change occurs at all sloughing surfaces, but the minute size of the tooth-pulp, and the ease with which it can be isolated and examined with the morbid parts in undisturbed relation, afford exceptional opportunities for making the observation. In the accompanying illustrations specimens of this vascular

FIG. 4.

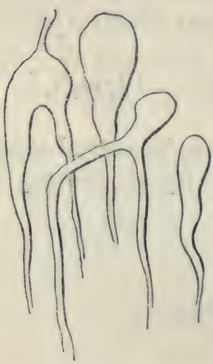
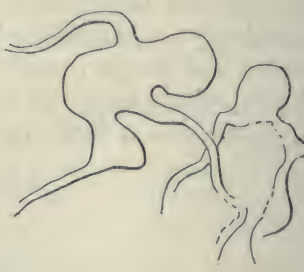


FIG. 5.



dilatation are shown as they occur in the fang (Fig. IV) and in the central chamber (Fig. V). In the former the general course of the vascular plexuses is longitudinal; in the latter the vessels are contorted and confused, and the dilated ampullæ vary accordingly.

The facility with which the tooth-pulp suppurates appears to be remarkable. This unquestionably varies much with different organs, and the persistence of the primitive cellular condition, which exists so largely in the tooth-pulp, probably leads to the rapid development of pus. It has appeared to me that the pus in the tooth-pulp is formed at the expense and by the multiplication of the cells (granules of Purkinje) which so largely pervade the pulp, by their direct conversion into pus-cells, just as Virchow has shown that the pus is formed in parenchymatous organs by the proliferation of the development cells of the connective tissue. Accompanying this rapid formation of pus there is a general softening and solution of the other tissues of the pulp. In the pus shreds of broken-up tissue are to be met with, and many "calcification islands" cast free ; but often the pus is remarkably liquid and free from other elements in the canal which, but a short time before, had been occupied by healthy pulp.

As I have remarked, pus may be formed and long retained in the pulp-cavity without emission, and it may be found in such cases in all those stages of disintegration which Virchow has so ably described and so correctly figured—from the first fatty degeneration to the complete emulsion of the cells, and these changes probably always occur when suppuration of the pulp is unattended by a discharging alveolar abscess.

ON SOME

OF THE

NEW GROWTHS DEVELOPED IN THE BREAST

ASSOCIATED WITH CYSTS.

By JOHN BIRKETT.

In some of the tumours observed in the mammary gland the characteristic or most prominent feature of the new growth is the cystic formation; that is to say, a section reveals a single cavity or a surface studded with an indefinite number of cavities, each circumscribed by a more or less delicate membranous structure.

The contents of these cysts is commonly fluid.

In addition, however, a more or less firm, solid growth may be observed attached to some part of their wall, or projecting itself into the cavity.

Therefore, in the careful examination of a cystic or cystiform tumour, the observer must investigate the cyst, its composition and relation to surrounding parts; its fluid contents, their objective characters and chemical composition; as well as the solid growth and its elementary forms.

Besides, in this class of cases a very striking feature is the occasional occurrence of a communication between the interior of the cyst and one of the lactiferous tubes of the gland. From this circumstance it follows that the attention of the patient is

generally first attracted to the complaint by the fluid which oozes from the nipple.

The careful investigation of a large number of cystic tumours in all their varieties of size, form, composition, duration, and progress, when left to nature or submitted to surgical treatment, leads me to indulge the hope that the details of a few select cases may not be uninteresting, nor entirely without advantage to the younger members of the profession more especially. But, before proceeding to the recital of the cases, I will call the attention of the reader, in the following tabular form, to the varieties of cysts met with in the formation of cystic tumours of the breast.

CYSTS IN THE BREAST.	I. Associated, communicating, or connected with the ducts.	1. Milk.	
		2. Growths; with serum coagulable, and sometimes tinged with blood.	1. Adenoid.
			2. Granulation cells.
			3. Cancer.
	II. Not connected with the ducts.	1. Blood.	
		2. Milk.	
		3. Simple cysts.	Serum not coagulable.
		4. Entozoon cysts.	
		5. Growths; with serum coagulable, tinged with blood and containing cholestearine.	1. Adenoid.
			2. Granulation cells.
			3. Cancer.

The following cases belong to both classes of the preceding table, and to the second and fifth group in each respectively. In both the fluid is serous, slightly tenacious, and forms threads when drawn out between the thumb and finger.

It is yellow, brown, black, or closely resembles the appearance of blood. It sometimes flows away from the nipple in considerable quantities, at other times merely in a few drops during the whole day, and just sufficient to mark the linen; but the quantity may generally be increased by gentle compression of the cyst.

It manifests an alkaline reaction. Both heat and nitric acid produce coagulation. After cooling in a test-tube two strata may be noticed; the uppermost consisting of clear serum tinged more or less deeply by hæmatine; the lower containing more or less admixture of blood-corpuscles. Thus the chemical composition of this fluid differs essentially from that derived from the simple or transudation cysts, which never contains any coagulable constituent.

Next, in respect to the intra-cystic growths. They differ not only in their external appearances and their elementary composition, but especially in their physiological relations. They belong to the two distinct groups of new formations or growths, the one local, harmless, and curable; the other having a power of diffusion, uncontrollable, destructive, and deadly.

The first case is one in which an adenoid growth was developed at thirty years of age, in a healthy widow. The tumour itself was not so distinctly confined within an envelope as usual, but a cyst was in communication with a duct, and serum escaped from the nipple.

Case 1.—*Adenoid growth; serum from nipple; removal; cure for eleven years and a half. Then development of carcinoma at cicatrix; operation; cicatrization.*

A widow, when thirty years old, observed a small swelling amongst the clavicular lobes of the left breast, about seven months before she consulted me in October, 1859, at the request of Mr. G. H. Jackson, of Tottenham. She had been a widow seven years, and her only child was nearly ten years of age. That infant she suckled less with the affected gland than the right one. She had enjoyed good health, and was apparently in sound health. The gland being small enabled one to ascertain that the tumour was composed of nodules, in some of which fluid could be detected. It was near the nipple, and by gentle pressure a few drops of serum could be expressed therefrom, which was clear, bright yellow, viscid, and coagulable by heat. The general shape of the tumour was elongated, the long axis extending from the nipple to the periphery of the gland, becoming widest where most distant from the nipple. The growth had doubled its size in about seven months. It was not painful; the nipple was not retracted; the axillary lymphatic glands were unaffected; no cause could be assigned for its origin; nor was there any trace of hereditary predisposition to carcinoma. The harmlessness of the tumour was recognised and stated, but as it continued to increase in spite of local applications, its excision was proposed, and the operation performed in December, 1859, when the growth was about nine

months old. We found a cyst formed in the tissue of the gland itself, which contained serum, and communicated with a duct near the nipple. Throughout the tissue of the lobe removed and of the gland structure exposed by the incision were small cysts, containing intra-cystic growths. There was no distinct, well-marked limiting envelope around the tumour, but the cyst and all the new growths were so closely identified with the ordinary tissue of the breast that it was absolutely necessary to cut its structure in order to remove effectually the whole of it. The wound healed quickly, and for a period of eleven years and a half the patient was perfectly well. The intra-cystic growths were composed of the cæcal terminations of gland tissue and fibre elements, the former loaded with epithelium.

In June, 1871, this patient felt a small tubercle at the upper end of the cicatrix, which slowly increased. It became attached to the skin, which was red, in the following December, and about May, 1872, it ulcerated.

I saw her in June, 1872. There was an excavated ulcer with thick everted edges at the upper and inner border of the left breast, which occupied the site of the cicatrix following the last operation in 1859. It was about an inch and a half in diameter. Hæmorrhage occasionally occurred from its surface. The lymphatic glands in the axilla were more than normally distinct, but did not seem to be infiltrated with carcinoma.

The nature of this growth, with its ulcerated surface, was too apparent to allow of long delay in its removal. The growth and entire breast were removed on October 15th, 1872, and the patient made a good recovery.

CASE 2.—*Serous cyst with escape of serum at the nipple, attributed to a contusion. Duration of disease twelve to fourteen years. Natural cure.*

This remarkable case I attended with the late Mr. Henry Wakefield.

A single lady, forty years of age, delicate, and of a rather sanguine constitution, observed, nine or ten years before I saw her, a bloody discharge from the left nipple. She attributed it to a blow on the breast. The discharge had continued ever since; and the nipple, always very small, was retracted. A slight

swelling near the nipple accompanied this discharge, which lately had increased rapidly, and, when I saw it, formed a fluctuating tumour with induration of the gland tissue around it. By compressing the cyst the tumour was lessened, in consequence of the escape of the serum from the nipple, but it could not be entirely dispersed. There was not the slightest pain when pressure was made on the tumour, but the third anterior intercostal nerve was unduly sensitive. The diagnosis at this time was the existence of a cyst containing serum which coagulated by heat and acid in communication with a duct surrounded by indurated gland tissue. I advised delay in the removal of the part affected, as the complaint was simply inconvenient, and no ill effects were likely to result from it. No material change took place until about four years after the above description was written, when, rather suddenly, uneasiness was felt in the part, constitutional disturbance was excited, the discharge from the nipple ceased, and local inflammation was developed. After the application of poultices suppuration took place, the pus pointed, the integuments ulcerated, and the escape of more than half a pint of matter and a piece of solid substance, as long as the little finger, took place. This was the statement of the patient. The discharge, which continued several days, diminished; the hole, which looked very deep at first, contracted and filled up; the nipple, before depressed, gradually rose up and, at last, became as healthy looking as that of the other side. In fact, the disease was cured by the efforts of nature alone, and has never reappeared in the eighteen years which have since elapsed.

CASE 3.—*Cystic disease of about seven years' duration consequent upon a direct local contusion. Abscess. Formation of a tumour subsequently; serous discharge from nipple; ulceration of integuments; projection of a growth through the opening; discharge therefrom. Removal of breast; cicatrization and permanent cure.* (See Plate II, fig. 2.)

In 1860 I was asked by Mr. Clark, of Twickenham, to see a lady, forty-five years old, who, for about seven years, had been aware of the presence of some complaint in the right breast.

I elicited the following history. In 1853 she received a blow on the right breast from a man in the street, after which blood flowed from the nipple. An abscess formed two months afterwards and was opened, a cupful of matter escaping. It healed, some hardness remained, and occasionally bloody fluid oozed from the nipple. At times half a pint of fluid would flow daily. Subsequently a soft tumour formed, the skin ulcerated about a fortnight before I saw her, and blood and fluid escaped. At this time a soft, vascular, flocculent growth, very like everted mucous membrane, projected slightly from an opening in the integument, with which, however, it was *not* united. Sero-sanguineous discharge flowed from the opening. She did not complain of pain. The nipple, some time since inverted, was now everted. The axillary lymphatic glands were tender when pressed, but not infiltrated. Her general health was good, although she was thinner, as much from mental anxiety, probably, as from any other cause. The entire gland was removed by Mr. Clark, and the wound healed in a few days. A section through the disease and what seemed to be the remains of gland tissue exposed a circumscribed space or cyst whose walls were firm and fibrous embedded in adipose tissue, for the true gland structure was nowhere visible. Three pedunculated masses of soft, vascular, new growth were hanging from the cyst-wall. From the nipple a bristle was passable along a duct into the cyst. The intra-cystic growth was composed of fibre tissue, nucleated bodies of variable shapes and a reticular stroma with an arrangement like papillæ or villi. The patient speedily improved in health after the operation and is now quite well, twelve years having elapsed since its performance.

CASE 4.—*Cystiform growth; dark-coloured serous discharge at the nipple. Duration of complaint about three years. Removal of tumour only, cicatrization, and freedom from any recurrence for five years.*

A patient, fifty-one years old, consulted me on account of a tumour in the right breast which had been observed nearly three years, and during which period there had been more or

less continual flow of serum from the nipple. She was a married and prolific woman, delicate in appearance, and had suckled with the affected breast. The catamenia had ceased. Amongst the abdominal lobes there was an oval tumour, irregular at its sides, but not upon its anterior surface. It was clearly formed of fluid, for, by compressing it, serum flowed from the nipple. Still I could not empty the cyst. After collecting a few drops of the serum on a piece of glass and applying heat, its coagulation was perfect. I punctured the cyst and withdrew four drachms of dark-brown serum. This was alkaline and entirely coagulated by heat and acid. I could now feel either other very small cysts or solid growths. The size of the tumour was, therefore, only partially diminished. The next day the cyst was nearly as full of fluid as before. Further treatment was postponed for a short time; but, two months subsequently, having the assistance of Mr. G. Forbes, I excised the tumour, leaving the nipple and upper part of the gland, which felt quite healthy. Very little blood was lost and the patient made a rapid recovery without a drawback. The cyst contained four or five drachms of serum which resembled that above described in its chemical characters. The ducts were dilated and either formed the cysts or opened into them. The new growth which was attached to their walls was very vascular and resembled closely the large villous papillæ often seen growing upon mucous membranes when closely examined by the unassisted eye as well as when magnified.

This patient continues well, although five years have elapsed since the operation.

Case 5.—*Sero-cystic disease of Brodie, of about a year's duration; serous discharge from nipple; removal, cicatrization. Fourteen years afterwards formation of another cyst, its removal and cure. Six years subsequently growth of another tumour, which seemed, at first, to be cystic, but ultimately assumed all the objective signs of carcinoma.*

I was consulted in 1861 by a patient who gave the following remarkable and interesting history of her case. She was seventy-four years old, and had enjoyed exceedingly good

health. At the age of fifty-two she first observed a swelling in the right breast, amongst the sternal lobes, which, after continuing there and increasing for about a year, was removed by Mr. J. Dashwood, Sir Benjamin Brodie being present, without much interference with the organ. Sero-sanguineous fluid escaped from the nipple before the removal of the tumour. The disease was termed, by Brodie, sero-cystic. A period of fourteen years had passed away without any inconvenience resulting from the disease, when she discovered a small lump in the same breast and near the cicatrix resulting from the first operation. This was removed two or three months after its observation by Mr. Paget, who described it, in a note to me, as a "thin-walled, simple cyst, containing a turbid, yellowish, synovia-like fluid." Rather more than six years subsequently she felt another tumour in the same breast, but amongst the *axillary* lobes, and when I saw her it had existed four or five months. There was an escape of bloody serum from the nipple, which was not retracted, a globular elastic tumour was perceptible amongst the axillary lobes, clearly a cyst containing fluid, and the axillary lymphatic glands were unaffected. Her general health was declining and she had suffered more or less with bronchitis upon many occasions. Under these circumstances the removal of the breast seemed scarcely admissible, and the case was treated by palliatives. The tumour gradually increased and became very hard, and for the last six months she suffered extremely from some morbid condition of the liver rather than from the breast. Her life was terminated by an attack of bronchitis. She survived the observation of the third growth about two years, and the development of the first twenty-three years. Unfortunately I had no opportunity after death for the examination of the local disease, which had assumed the external characteristics of carcinoma.

The next series of cases illustrates a class of the cystic diseases of the mammary gland, in which a globular, fluctuating tumour is distinctly perceptible to the touch, but in which the valuable sign derived from the escape of a serous fluid at the nipple is wanting. These cases are not so common as the last described. When the cyst is single it commonly attains large dimensions. The serum having no opening by

which to flow away accumulates within the cyst, and tumours of from four to six inches in diameter are slowly formed. The undulation or thrill through the circumscribed collection of fluid is in such cases very characteristic.

The actual growth within the cyst is oftentimes very small and bears no due proportion to the bulk of the tumour. This fact should be borne in mind when excision is about to be performed, for by emptying the cyst a day or two before, or even at the time, the size of the wound, and consequently the gravity of the operation, is much diminished.

When the tumour has been of long standing, a year or two, or more, for example, the fluid has laminæ of cholesterine in large quantities floating in it.

CASE 6.—*Tumour of two years and three quarters' growth, attributed to a contusion. Puncture of cyst, growth within perceptible when empty. Excision of cyst and growth only, cicatrization of wound, and freedom from recurrence.*

A patient, forty years old, was under my care in the hospital in 1865 on account of a tumour in the left breast, which she had observed for three years and three quarters. She was single, nervous, delicate, menorrhagic, but of average good health. She accidentally noticed a small, hard lump among the sternal lobes of the gland, which afterwards produced slight darting pains in the part. It was in the site of a contusion received a short time before. When I first saw it, about fourteen days preceding admission, the tumour was globular, irregular on the surface, and clearly due to a collection of fluid. The nipple was of normal shape and size, and there never had been any flow of serum from it.

I punctured the cyst with a trocar and canula and removed two and a half ounces of dark-brown serum. When it was thus emptied of its fluid contents I could feel a small nodule at the upper extremity of the cyst, which might have been gland tissue only, for the tumour was obscured by that part of the normal gland which overlaid it. After standing a few hours in a test tube the fluid separated into two portions. The lowermost fourth division of the tube contained precipitated blood discs, the

remaining upper divisions dark, but clear serum. This serum coagulated by heat and nitric acid into a solid mass. The fluid soon re-formed. In a day or two the tumour was as large as when first seen. Under these circumstances I advised its excision, and that operation was performed without removing the entire gland. The wall of the cyst was thin, it contained serum, exactly like that above described, and a very small growth, soft and vascular. Its elements were a delicate fibre tissue, and elementary cells. The wound healed and the patient is now, seven years after the operation, quite well.

CASE 7.—*Tumour of one year and ten months' growth, attributed by the patient to a contusion. Cyst emptied, afterwards excised; cicatrization of wound. Patient continued quite well for twenty years afterwards.* (See Plate I, fig. 1.)

In March, 1851, a poor woman came to Guy's Hospital amongst the out-patients, and showed me a large tumour in the left breast. She was forty-four years old, married, a mother of two children, the youngest being nine years of age, both of whom she suckled with the affected breast and the right indiscriminately. She had enjoyed good health, was remarkably excitable in manner, thin and anxious. The catamenia appeared regularly. The mammary glands were very small and had never before been diseased.

Eighteen months before I saw her a small lump was felt to the sternal side of the left nipple in the gland. This slowly enlarged without pain, causing simply a sensation of fulness.

A tumour, about four or five inches in diameter, was situated in the sternal half of the left breast, its surface was regular and the skin over it quite healthy. A circumscribed collection of fluid was easily detected, the cyst wall being thin and tense. The nipple was merely expanded, not at all drawn in. The axillary glands were not affected.

She attributed the swelling to a contusion received a few weeks before the discovery of the lump. A seton, leeches, and ointments had been used to cure the complaint.

March 31st.—The fluctuation of fluid being so very distinct in the tumour, I inserted a trocar and canula and removed

about six ounces of bloody serum. When the breast had resumed its normal size three small, hard nodules were distinguishable at the lower and outer region of the site of the original tumour. These were not interfered with. The breast was strapped with soap plaster and bandaged in the usual manner. The cyst appeared to be situated behind the gland tissue.

April 14th.—Fourteen days after the above described operation the tumour was as large as before, and the cyst quite as tense. An ointment was applied over it, Ung. Hyd. Compos., and iodine administered internally.

May 2nd.—The tumour being very tense and inconvenient from its projection, I made a second puncture and withdrew about six ounces of sanguineous serum. Three days afterwards the tumour was as large as before.

On July 2nd she was admitted into Dorcas Ward, and on the 17th I excised the cyst, together with that portion of the breast which seemed most intimately blended with it, the nipple and the clavicular lobes of the gland being left intact. There were no accidents interfering with cicatrization, and the patient left the hospital about the middle of August quite well.

After removing the little fat which surrounded the piece of the breast and growth, the principal cyst seemed to consist of two portions. The depression, however, which is very well shown in the drawing numbered 403^{70} in the museum catalogue, was merely due to the more dense state of the walls of the cyst at that part.

The breast structure itself was atrophied, and in parts numerous minute, purple-coloured cysts were visible. One cyst, about half an inch in diameter, contained some delicate, soft cell growths, as seen in drawing.

When the large cyst was cut open several soft, pedunculated growths were exposed to view. The appearance then presented is shown in Plate I, fig. 1. The largest of the growths was attached to the internal surface of the cyst; the peduncle was about an inch long. The solid growth was very lobulated, and the separated growths composing it were suspended each of them by a more or less distinct stalk. Within these stalks the blood-vessels traversed the tissues from the cyst-wall. Some separate growths were seen in other parts of the cyst.

The minute elements of the growths were fibre tissue and

nucleated cells. The former resembled the wavy element of connective tissue, the latter were elongated, nucleated plates or scales, with a small nucleus, and coherent in masses. The cyst was strong, firmly incorporated in some parts with the wasted breast tissue, and its interior was lined with tesselated epithelium.

The subsequent history of this patient's case to the present moment is of great interest. From time to time she has visited me at Guy's Hospital, and has been for twenty years perfectly free from any repetition of the complaint. There has not been a trace either of growth in the cicatrix on the left side of the chest, or of infection of the axillary lymphatic glands. The right breast is also unaffected. Although between sixty and seventy years old, she appeared in good health, in spite of the toil, hardships, and privations incidental to the social position of the wife of a labouring man.

Case 8.—*Carcinoma of breast associated with a cyst; removal; recovery from operation; subsequently death from general diffusion of cancer.* (See Plate II, fig. 1.)

The patient, a married and prolific woman, when thirty years old observed a small tumour in the left breast. It slowly increased. Ten years after its observation I was consulted. I felt an irregular, hard, movable growth on the surface of the axillary lobes of the breast, about three inches in diameter. The integuments overlying it were dimpled. The nipple was not affected. Shooting, darting, stabbing pain had been felt through the tumour occasionally. The general health was good, the aspect healthy, the catamenia normal. The axillary glands were not affected. Palliatives were used for about three months. At this time the swelling somewhat suddenly enlarged, fluctuation of fluid was distinct, and the tumour, together with the part of the breast involved, was removed.

A section of the tumour and cyst is represented in Plate II, fig. 1. The growth itself was developed much more in the fat about the breast than in the gland tissue of that organ, although it was connected with its surface. The structure and elements of the growth were cancer.

The cyst-walls, as seen in the drawing, are much folded,

and therefore the size of the cavity of the cyst is greatly diminished. The wall of the cyst is seen on either side of the growth, but over the surface of this it does not extend in the least. The growth occupies a part of the cavity of the cyst, and looks as if it had pushed itself through the tissues of the cyst-walls rather than as growing from them.

This arrangement is precisely the reverse of that described in the cases before related, and contrasts strongly with that delineated on the same plate, fig. 2. The fluid in the cyst was sero-sanguineous.

This patient remained perfectly well for two years and three quarters, when a growth formed in the left axilla without any recurrence at or near the cicatrix of the wound. Gradually, and accompanied with intense suffering, carcinomatous growths became developed in several regions, and after lingering about two years she died in an extreme degree of emaciation, and about fourteen years after the first observation of a tumour in the breast.

An examination after death revealed a small ulceration over the axillary tumour, towards which the cicatrix was drawn. There was a broken left humerus at the site of the insertion of the deltoid muscle, where a tumour of carcinoma had been developed in the bone. The left upper extremity was œdematous. A large growth of carcinoma was formed around the left trochanter major, extending to the left os innominatum. The bodies of the third, fourth, and fifth lumbar vertebræ were converted into a growth of carcinoma, without alteration of their shape. The left upper ribs were cancerous. There were cancer tubera in the liver. It is remarkable that the organs on the left side of the body chiefly were affected with cancer, the exception being the lumbar vertebræ.

Case 9.—*Cyst, emptied, refilled; growth of carcinoma around and outside the walls of the cyst; removal of breast; cicatrization of wound; no local recurrence, but death ten years and nine months afterwards from cachexia.* (See Plate I, fig. 2.)

This patient was forty-three years old when she first observed

a swelling amongst the axillary lobes of the right breast, about a year since. She was the mother of three living children, and had had several miscarriages. The last was born seven years ago. The catamenia were regular, the general health had been ordinarily delicate, and she was nervous, weak, and faint when the tumour first appeared. She felt pain in the breast for some time before discovering the lump, which was at first small and hard, but had latterly during the last three or four months become softer.

The skin over the tumour was red, and the presence of fluid being detected a puncture of the cyst was made, and about four ounces of clear serum escaped. A piece of lint was placed in the wound, suppuration was established, and the discharge continued profusely for some weeks.

The cyst at last having contracted, although not healed, a second cyst formed above the first one, and the integuments over it inflamed. Her general health had rather improved, despite the pain she suffered and the suppuration. The axillary lymphatic glands were quite unaffected.

In January, 1853, the tumour having enlarged, an offensive discharge escaping from its centre, and the ulceration of the integument assuming the appearances of carcinoma, the whole breast was removed by Mr. Kellock, of Stamford Hill. A section was made through the centre of the organ, and the appearances seen are delineated in a coloured drawing which is numbered 409^{80} in the museum at Guy's Hospital, and a copy of which (Plate I, fig. 2) illustrates this paper.

The diseased part was adherent to the pectoral muscle. The nipple was retracted and the gland tissue wasted. A considerable quantity of fat surrounded the breast. Around the outside of the wall of the cyst there was a large growth of carcinoma. At the posterior part of the section the growth and cyst-wall seem to have united together, so that the line of demarcation between them is very indistinct. In point of fact the section now resembles an ordinary mass of carcinoma, with central softening and ulceration of the integuments.

The explanation of the somewhat unusual phenomena in this case of cancer is the following. The first small hard nodule was a growth of cancer. The soft, fluctuating, rapidly forming tumour was the result of effusion of serum on the anterior

surface of the primary growth; a cyst or sac enclosing this serum was developed, and as the fluid could not escape into the surrounding connective tissue, this tumour became larger and larger. After the first puncture was made, and when the cyst was empty, some intra-cystic growths were visible, but they subsequently sloughed as the result of prolonged inflammatory action. In all the essential characteristics, then, the growth in this case closely resembled the last; but the objective signs varied in consequence of different local circumstances.

The subsequent progress of the case was also very different. This patient survived the removal of the tumour ten years and nine months. For several years she enjoyed good health. There was not any recurrent growth visible anywhere. During the last eighteen months of her life she slowly declined, her strength failed, the appetite was lost, she became extremely emaciated, and she sunk away in a state of extreme cachexia. But there were none of the usual signs of cancer, and especially in those parts, as the cicatrix of the wound and the axillary region of the same side, where the disease so commonly reappears, the tissues and organs were healthy. Yet this woman survived the discovery of the disease about twelve years, and the operation nearly eleven.

DESCRIPTION OF PLATE I,

Illustrating Mr. Birkett's Paper on some cases of New Growths developed in the Breast associated with Cysts.

Plate I.

Fig. 1.—A copy of a drawing in the museum, No. 403[77], represents the large cyst cut open described in Case 7. Other drawings in the museum, Nos. 403[70, 78], show the appearances presented by the growth before excision, and of the cyst unopened. The preparation is numbered 2294[20].

a indicates the internal surface of the cyst, the black lateral patches representing extravasated blood beneath the thin lining membrane.

b points to the pedunculated lobulated growth springing from the cyst-wall, the black linear markings on the pedicle representing the blood-vessels ramifying within the tissue. At the uppermost part of the cyst other growths are visible.

c, the cyst-wall. *d*, glandular tissue of breast, firm and fibrous.

Fig. 2.—Represents a section of the tumour removed from the patient, Case 9. Coloured drawing in museum, 409[80].

a, a. These letters indicate the situation of the new growth developed around the outside of the wall of the cyst.

b, the interior of the cyst which had been reduced by the pressure of the outside growth.

c, wall of cyst and the ulcerated opening in the integuments.

e, nipple. *d*, atrophied gland surrounded by fat.

Plate. I.

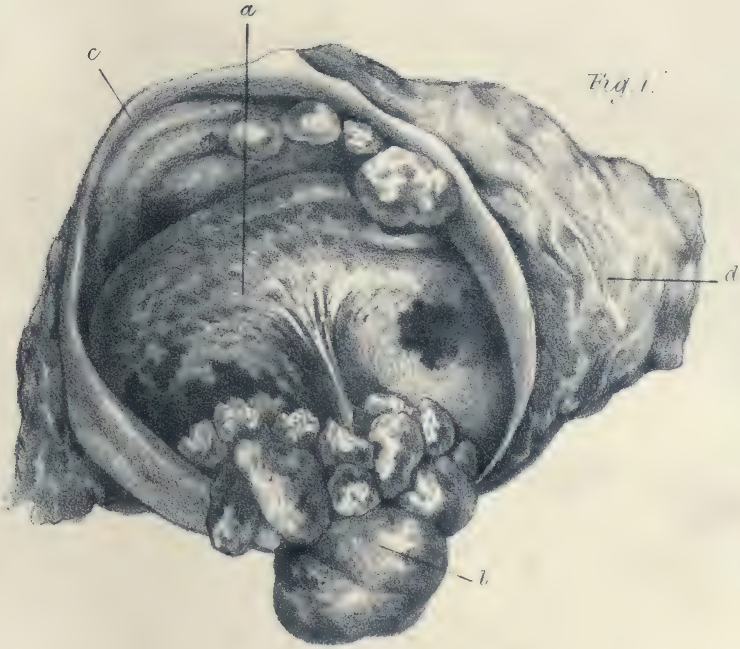


Fig. 1.

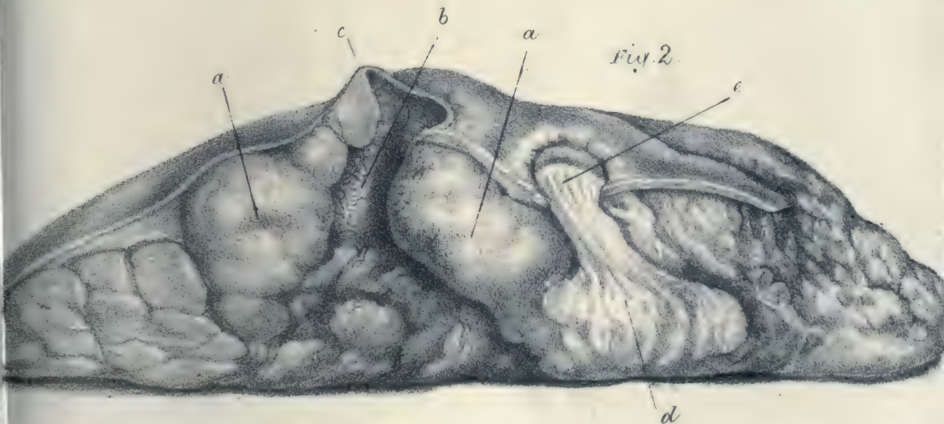


Fig. 2.

Hurst ad nat delin

M & N Hanhart imp

DESCRIPTION OF PLATE II,

Illustrating Mr. Birkett's Paper on some cases of New Growths developed in the Breast associated with Cysts.

Fig. 1.—Delineation of a section of the growth removed from the patient, Case 8.

a, the new growth projecting into the cavity of the cyst, *b*; whilst the remainder is surrounded by the ordinary subcutaneous fat.

b, cavity of the cyst.

c, the cyst-wall.

d, piece of the mammary gland.

e, surface of integument.

Fig. 2.—Section of the cyst and surrounding fat removed from the patient whose case is numbered 3.

a, interior of cyst.

b^1, b^2, b^3, intra-cystic growths. In b^1 the pedicle by which it is attached to the cyst is plainly indicated by the piece of glass passed beneath it. b^2 has a broader pedicle.

c, thin margin of ulcerated opening in integuments.

d, nipple, a piece of glass passed along a duct into the cyst.

Plate. II.

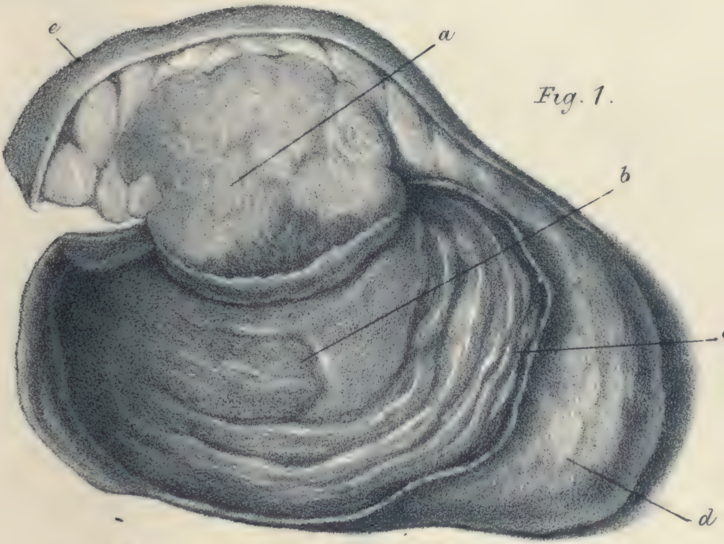


Fig. 1.

Fig. 2.

Hurst ad nat. deln.

M&N Hanhart imp.

NUMERICAL ANALYSIS

OF THE

PATIENTS TREATED IN GUY'S HOSPITAL

DURING 1871.

BY J. C. STEELE, M.D.

Following the course adopted in previous reports, the medical benefits of the charity have been divided into two important classes: the first embracing the enumeration of such cases as have been received into the wards of the hospital; and the second, those only who have received advice and medicine as out-patients. The total number entered in both departments during the year has amounted to 78,608, of which 5549 belonged to the former class, and 73,059 to the latter. On comparing the number of in-patients treated during the past year with the corresponding numbers admitted for several years preceding 1871, there is noticed to be a considerable increase in the past year, due to the opening of the new wards in the course of the summer months. This increase of admissions numbered 426 over the corresponding return for 1870, and presents an average increase of 310 over each of the three years preceding 1870. In consequence of several departments remaining continuously occupied for some years prior to 1867, the total number annually treated in those years approached near to, and in the year 1865 exceeded, the return of admissions for the past year—results not likely to be repeated, from the extended accommodation which the hospital now possesses. The increase alluded to as having occurred during the past year is pretty equally proportioned between the

medical and surgical wards, as the reserve accommodation has been made applicable to both departments.

The length of residence of the patients has maintained an average during the year of 37·58 days, or rather more than half a day longer than in 1870, when it amouuted to 36·92; but exactly the same period of stay as the medical cases averaged during that year. The mean residence of the medical and surgical cases, respectively, have presented little difference during the past year, the former amounting to 37·56, and the latter to 37·59 days: so that the disparity betwixt the two years is mainly attributable to the greater length of residence of the surgical cases during the past year; which residence has been fully a day longer than the average of years preceding 1871. As a rule, the length of residence is mainly influenced by the facilities afforded for admission to protracted, or what are often called, incurable cases; and as several instances of this description remained in the surgical wards during the whole, or greater part of the year, their residence has had an indirect effect of increasing the average stay of the patients of the department.

The total number of deaths during the year amounted to 555, or 57 more than in 1870, which year was noticed at the time to present a higher average mortality, namely, 10·76, of the cases treated to a termination, than had obtained since the year 1854, when an epidemic of cholera seriously aggravated the usual mortality. The per centage mortality of the past year, rising as it had done to 11·07, in the absence of any extraordinary exciting cause, is, both proportionally as regards the total numbers admitted, and relatively with respect to each main department of disease, higher than formerly; and it becomes an important question as to what causes these results are attributable. The explanation of the higher mortality of late years, the existence of which is being felt by other institutions of a kindred character, may be traced to various causes operating in common, the most important of which are the readier admission given to hopeless cases of disease; the annually increasing number of critical and urgent cases, which under no circumstances could be refused admission; and, as a consequence, the exclusion of others of a less grave character, which with less disadvantage may be treated as out-patients. A reference to

the disease list appended shows that, of the total deaths occurring in the year under review, not less than 88 were attributable to consumption alone, 65 to incurable affections of the heart and bloodvessels, 102 to severe and direct injuries, while not less than 92 suffering from various maladies or injuries, died within 24 hours of their admission. It may appear strange, but it is nevertheless consistent with the experience of the hospital, that the exclusion from it, or rather the facilities which are now afforded elsewhere for the reception, of cases of epidemic and febrile disease in special asylums, have had an indirect effect in increasing the average rate of mortality, inasmuch as the death rate of these diseases, taken collectively, has always been considerably below the average mortality of ordinary medical cases. During the year 1870, and notably during the annual period under consideration, there has been a marked diminution in the number of cases of febrile disease admitted, and a proportionate increase of ordinary cases, all tending to raise the standard of mortality. Besides the deaths which occurred within the hospital there were 20 persons brought in dead, in all of which cases a coroner's inquest was held. The total number of such inquests held in the course of the year amounted to 139.

The number of post mortem examinations made in the course of the year amounted to 374, and from the regulations passed by the governors during the previous years, with reference to these examinations, little or no difficulty was experienced in carrying them out satisfactorily.

The prevalence of the small-pox epidemic in London in the course of the year, and the liability of its introduction to the hospital by the friends and relatives of patients, rendered it expedient to prohibit the admission of the latter, except in cases of extreme illness, during the first few months of the year. At the same time, measures were taken to have all the patients resident in the hospital, and those subsequently admitted, protected by vaccination and revaccination. These precautions had the effect of preventing in no small degree the extension of the epidemic among the inmates, as the results fully proved; for, although 9 cases of the disease are entered on the disease list, it may be noticed that 5 of these contracted it elsewhere and were admitted under misapprehension, or before the eruption was fully

declared. Six of the cases entered on the Unrelieved column were transferred to the small-pox hospitals; the two females entered as cured were nurses in the employment of the hospital, one of whom had previously refused to be revaccinated, and had a very severe attack of small-pox in consequence; while the fatal case reported occurred in a person suffering from paralysis, and too ill to admit of removal to a small-pox hospital. By the end of March all the patients, with the exception of those whose injuries or diseases rendered the operation unadvisable, were revaccinated, and the restrictions with regard to the admission of visitors, which though salutary were found irksome and inconvenient in many ways, were rescinded. As the patients availing themselves of hospital relief represent the class of the population which suffers most from epidemic disease, a good opportunity was offered of testing the conditions of protection from small-pox, which the class taken collectively possessed, as well as the results of the measures taken to afford them further protection. With this object, Mr. Parker, one of the students, took careful and copious notes of the majority of the patients revaccinated, and from these details the following tabular analysis has been prepared. The figures represent only 319 of the total number, many of the cases presenting doubtful features, and which would have had a tendency to invalidate the return, having been carefully excluded:—

Cases said to have been vaccinated in infancy, or afterwards, ...		293
Of the above, those with well marked cicatrices were ..	117	
Cases in which cicatrices were not so well marked, ...	114	
Cases where no cicatrix was visible, ...	62	
		293
No previous history of having been vaccinated, ...	26	
Patients who had had small-pox after vaccination, ...	41	
Patients who had had small-pox without previous vaccination, ...	21	

Of the above number 286 were revaccinated in hospital, with the following results:—

Vaccine vesicles well defined, ...	171
Vaccine vesicles not so marked, ...	73
No effect, having been previously vaccinated, ...	34
No effect, not previously vaccinated, ...	8

From this analysis it would appear that, although 92 per cent. of the patients satisfied themselves that means had been taken for their protection from small-pox, not more than 78 per cent. showed any marks of vaccination on their bodies, and only

40 per cent. gave evidence of being what may be termed well protected. Of the 319 cases 62 had already had small-pox, and of these, 41 had marks to show that they had been vaccinated, while 21 had no such distinctive marks; so that, irrespective of the modified form which the disease assumes in the protected, the analysis points out that the liability to an attack is diminished in the case of the latter to 17 per cent., while 24 per cent. of the unvaccinated suffered, exclusive of those who may have succumbed to the disease. That so large an average as one in six of the so-called vaccinated patients should have had small-pox, is a fair proof that the operation had been imperfectly performed in many instances; but the figures show that, as a rule, there was not the neglect that might have been anticipated on the part of the patients in taking precautions for their own security. Judging of the feelings of the poorer classes from the experience afforded by the hospital, there is no reason to surmise that they are in any way prejudiced against the safeguard of vaccination; but it is to be feared that in too many instances, from no fault of their own, they are as liable to attacks of small-pox as those who have never troubled themselves about a protective remedy.

With reference to other forms of fever, the demand for admission has not been urgent during the year; and the few remaining cases of contagious fever admitted were unattended with fatal consequences, or with the extension of the disease to the other inmates. It may fairly be assumed that the means taken by the Local Government Board to provide abundant accommodation for fever will, for the future, diminish to a large extent the applications for the admission of this class of patients; but from the obscurity attending the symptoms at the outset of these diseases, coupled with the indisposition to refuse admission to cases of serious illness when brought to the hospital, there must always be a certain contingent of such cases in the wards. In this respect, there is little cause for apprehension that the necessary requirements of clinical instruction will be seriously interfered with; while, on the other hand, a salutary check is provided against the indiscriminate admission of too great a number of persons suffering from contagious diseases.

The list of accidents which, from causes somewhat difficult

to account for, had diminished numerically for several years in succession—namely, from 1051 in 1865 to 788 in 1869—has again risen during the last two years, and in 1871 comprised 892 of the admissions, of which 85 were attended with fatal results. The numbers apportioned to the various causes into which the accident list is arranged, maintain a remarkable correspondence from year to year, both in numbers and mortality. The increase during the past two years, which, however, is of no great amount, is mainly traceable to collisions with street vehicles, and to falls on the ground and from heights. The number of railway accidents admitted appears to be quite stationary, maintaining an average of 30 each year, with a corresponding mortality of 37 per cent. It must be borne in mind that the accident list does not comprise the numerous minor accidents treated in the surgery of the hospital and in the out-patient room, which numbers at least five times as many as are admitted to the wards of the hospital.

The table of surgical operations includes 28 amputations for injury, and 47 for disease, showing an increase of 7 cases over the corresponding return for the previous year. By far the largest entry in the amputation list is that bearing on amputation of the thigh for disease of the knee-joint, embracing, as it does, 25 of the cases. The success of this operation does not appear to have been so great on the average as in former years, probably from the fact that several cases, probably of a less grave character than the others, and which in former years would most certainly have undergone amputation through the thigh, underwent the operation of amputation through the knee-joint. This last operation appears to have been performed six times during the year, with but one fatal result. With respect to the second table of operations, classified under the term Miscellaneous, it has been thought advisable to exclude a number of operations of a less grave character than those entered in the list; consequently the total numbers appear less than the average of former years. It may be noticed, however, that, with regard to the more formidable series of operations, the returns are quite as numerous as on former occasions.

On comparing the number of persons entered on the records during the year as out-patients, there is observed a considerable

falling off, when contrasted with the corresponding return for 1870. The decrease has amounted to 3589, a large numerical amount, but small when the total amount is taken into consideration, which comprised during the year not less than 73,059 persons. It ought be be fully understood that the out-patient department of the hospital is worked under two important divisions—the first embracing such patients as come under the immediate attention of the medical staff, and who are furnished with cards and letters to enable them to continue an attendance for eight successive weeks; and the second including such as are seen and examined by the subordinate resident staff and by the senior students. The former alone come under the category of regular out-patients, and are arranged under six subdivisions, of which two may be classified as ordinary (medical and surgical), and four as belonging to special departments of hospital relief. As the new cards issued daily in this department are limited to a specified number, it follows that the total numbers relieved in it preserve a pretty equal proportion from year to year, fluctuating usually between 14,000 and 15,000 persons. The number during the past year has amounted to 14,847. With respect to the second division of out-patients, it may be noticed that the numbers applying for relief in the department vary numerically from year to year, and, like other departments of relief, have rather a tendency to increase than to diminish in amount; the return for 1871 being quite an exception to the experience of former years. In this category are comprised such persons as have not been fortunate enough to obtain cards of continued attendance at the daily gatherings in the out-patient rooms, minor accidents, tooth extractions, and, in fact, all cases which can be relieved by one attendance. To this number are to be added 2240 obstetric cases, attended at their own homes by students of the hospital, being an increase of 57 over the corresponding return for 1870; on which occasion it was remarked that the Maternity department had shown up to that time a steady and progressive extension. The deaths supervening upon labour during the past year have been 8 in number, an average of 3·57 per 1000 cases; 6 of the deaths having been traced to puerperal causes, and 2 to pre-existing diseases.

STATISTICS OF GUY'S HOSPITAL

FOR 1871.

I.—*General Statement of the Number of Patients, with Results of Treatment, received into the Hospital during* 1871.

Remaining 1st January, 1871,	499
Admitted during the year,	5050
Total,	5549

Discharged well or convalescent,	1832	
Relieved,	2203	
Unrelieved,	422	
Died,	555	
Remaining 1st January, 1872,	537	
		5549

MEDICAL WARDS.

Remaining 1st January, 1871,		189
Admitted during the year,		2007
Total,		2196
Discharged,	1632	
Died,	352	
Remaining 1st January, 1872,	212	
		2196

SURGICAL WARDS.

Remaining 1st January, 1871,		310
Admitted during the year,		3043
Total,		3353
Discharged,	2825	
Died,	203	
Remaining 1st January, 1872,	325	
		3353

Average number resident, daily, throughout the year, .. 529 {Males, 301; Females, 228}

Mean residence of each patient, in days, 37·58.

Rate of mortality over all the cases, 11·07 per cent., {Males, 12·28 per cent.; Females, 9·22 per cent.}

MEDICAL CASES.

Average number in Hospital, 216 {M., 111; F., 105}

Mean residence, ... 37·56 days.

Rate of mortality, 17·74 per cent., {M., 20·5; F., 14·6}

SURGICAL CASES.

Average number in Hospital, 313 {M., 190; F., 123}

Mean residence, ... 37·59 days.

Rate of mortality 6·70 per cent., {M., 7·9; F., 4·3}

II.—*Table of Monthly Admissions, Dismissions, and Deaths, distinguishing the Sexes.*

1871.	MEDICAL PATIENTS.						SURGICAL PATIENTS.					
	Admitted.		Discharged.		Died.		Admitted.		Discharged.		Died.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
January	80	59	53	47	25	14	136	98	133	82	12	6
February	60	72	57	56	14	8	121	73	125	78	6	4
March	91	70	58	57	15	16	164	76	135	69	16	3
April	82	66	67	55	21	10	147	85	141	87	13	5
May	100	43	74	57	14	11	190	96	162	74	13	3
June	93	96	65	70	20	11	181	92	176	80	8	4
July	89	96	73	87	15	12	181	111	171	106	15	4
August	108	99	75	79	14	9	183	95	174	96	15	5
September	96	92	88	87	25	13	187	84	174	87	17	5
October	98	91	81	81	17	17	179	92	157	97	14	1
November	94	94	75	63	17	13	152	88	141	74	11	1
December	71	67	61	66	17	4	164	68	140	66	18	4
Total	1062	945	827	805	214	138	1985	1058	1829	996	158	45

III.—*General Summary of the Tables of Diseases.*

DISEASES.	Total.	Cured.		Relieved.		Unrelieved.		Died.	
	M. & F.	M.	F.	M.	F.	M.	F.	M.	F.
1. General diseases	1059	211	143	209	321	38	21	70	46
2. Diseases of the nervous system	332	27	49	115	57	39	18	19	8
3. Diseases of the eye, ear, and nose	386	69	56	138	75	25	23	..	..
4. Diseases of the heart and blood-vessels	244	13	6	66	63	22	11	43	20
5. Diseases of the respiratory organs.	195	56	20	51	20	4	2	31	11
6. Diseases of the digestive organs	420	88	63	100	59	21	22	39	28
7. Diseases of the urinary organs	383	82	14	166	19	32	11	47	12
8. Diseases of the female organs of generation	254	..	84	..	119	..	27	..	24
9. Diseases of the organs of locomotion	464	35	32	189	110	34	27	26	11
10. Diseases of the cellular tissue and skin	333	79	59	77	74	23	8	9	4
11. Miscellaneous returns	28	8	9	2	5	2	1	..	1
12. Poisons and general injuries	79	30	15	7	6	1	..	16	4
13. Local injuries	835	479	105	112	43	6	4	72	14
Total	5012	1177	655	1232	971	247	175	372	183

IV.—Tables of Diseases, with Results of Treatment.

1.—*General Diseases, including Epidemic, Endemic, Contagious, and Constitutional Distempers.*

	Cured.		Relieved.		Unrelieved.		Died.		Registered Fatal Complications, &c.
	M.	F.	M.	F.	M.	F.	M.	F.	
Small-pox		2	..	..	6	..	..	1	Six cases sent to small-pox hospital.
Scarlet fever		3	..	1	..	..	..	..	
Typhus fever	3	2	..	..	..	..	..	..	
Typhoid fever	6	6	1	..	..	..	2	1	
Relapsing fever	3	1	..	..	..	..	..	..	
Simple continued fever	2	4	..	..	..	..	..	..	
Febricula	2	7	..	..	..	..	..	..	
Ague	8	4	3	1	..	..	..	..	
Hooping-cough	..	..	..	1	..	..	..	..	
Diphtheria	..	..	..	..	..	..	1	..	
Erysipelas	18	16	6	..	..	..	3	3	Syphilis 1, amyloid viscera 1.
Pyæmia (simple)	1	2	..	1	..	..	1	..	Puerperal.
Acute rheumatism	56	50	8	23	..	..	2	2	Coma, Delirium, Endocarditis (Erysipelas).
Gonorrhœal rheumatism	2	..	1	2	..	..	..	..	
Synovial rheumatism	1	..	2	3	..	1	..	..	
Lumbago	1	..	..	..	..	..	..	..	
Chronic rheumatism	23	3	18	9	2	..	..	..	
Gout	5	..	8	4	..	..	2	..	Aortic disease, Renal disease.
Rheumatic gout	4	1	1	..	..	..	..	..	
Syphilis	52	18	94	214	6	7	2	..	Syphilit. disease of internal organs.
Cancerous growths	..	..	..	2	1	..	2	..	
Colloid growths—									
Sebaceous	4	7	..	..	..	..	..	..	
Fatty	1	3	..	..	..	1	..	1	Septicæmia.
Cystic	1	2	..	1	..	1	..	..	
Fibro-plastic	3	3	1	1	1	..	..	..	
Fibrous	..	..	2	2	..	1	1	..	
Vascular	..	1	..	1	..	..	..	..	
Cartilaginous	..	..	1	..	1	..	..	..	
Glandular	..	1	..	..	..	..	..	..	
Osseous	2	1	..	1	..	..	..	..	
Warty	2	..	1	1	..	..	..	..	
Horny	1	..	..	..	..	..	..	..	
Not specified	..	..	..	1	1	..	1	..	Suffocation.
Lupus	..	..	1	5	5	..	..	..	
Rodent ulcer	..	..	1	..	1	..	..	..	
Scrofula (general)	..	..	1	..	2	1	..	..	
Phthisis	..	..	52	39	9	7	51	37	
Rickets	..	..	..	1	..	..	..	..	
Diabetes	1	..	3	..	2	1	2	..	Phthisis.
Purpura	1	..	..	..	..	1	..	..	
Anæmia	2	3	2	2	..	..	..	..	
Chlorosis	..	3	..	4	..	..	..	..	
Anasarca	4	..	2	1	1	..	..	..	
Farcy	1	..	..	..	..	..	..	..	
Total	211	143	209	321	38	21	70	46	

2.—*Diseases of the Nervous System.*

	Cured.		Relieved.		Unrelieved.		Died.		Registered Fatal Complications, &c.
	M.	F.	M.	F.	M.	F.	M.	F.	
Meningitis	..	..	..	..	..	..	2	1	
Abscess of brain	..	..	..	..	..	..	2	1	
Softening of brain	..	..	2	..	1	..	2	1	
Cerebral disease	1	..	7	3	6	..	..	1	Asphyxia.
Apoplexy	1	..	3	1	..	1	5	1	Dis. kidneys 2.
Hydrocephalus	..	..	..	..	..	..	1	..	Spina bifida.
Disease of Dura Mater	..	..	..	..	..	..	1	..	
Tumour of brain	..	..	..	1	2	2	1	..	
Tumour of Cerebellum	..	..	..	..	..	..	1	..	
Diseased spinal cord and membranes	..	..	6	..	1	..	..	..	
Paralysis	1	1	8	..	1	1	..	..	
Hemiplegia	2	2	15	5	2	2	..	..	
" partial	1	2	2	..	..	..	..	..	
Paraplegia	2	..	7	3	2	..	2	2	Pneumonia, hydatid, necrosed spine.
" partial	1	..	3	1	..	1	..	..	
Shaking palsy	..	..	1	..	..	..	..	..	
Locomotor ataxy	..	..	5	2	3	..	..	..	
Infantile paralysis	..	..	..	..	3	..	..	..	
Local paralysis	..	..	3	1	3	1	..	..	
Facial paralysis	..	1	2	1	2	1	..	..	
Aphasia	..	..	4	1	1	..	..	..	
Lead paralysis	..	..	7	1	..	..	..	..	
Epilepsy	5	..	18	7	..	1	1	..	
Hysterical catalepsy	..	..	1	..	..	..	..	..	
Convulsions	..	1	..	..	..	..	..	1	
Spasm	..	..	1	..	..	..	..	..	
Chorea	4	16	7	9	1	1	1	..	
Hysteria	1	21	1	17	..	3	..	..	
Neuralgia	2	1	1	2	1	..	..	..	
Sciatica	3	..	5	1	..	..	..	..	
Pleurodynia	..	1	..	..	..	..	..	..	
Anæsthæsia	..	..	1	..	..	..	..	..	
Hypochondriasis	1	..	2	..	5	1	..	..	
Mania and idiotcy	..	..	1	..	4	2	..	..	
Vertigo and headache	2	1	1	1	..	..	..	..	
Nervous debility	..	2	1	..	1	1	..	..	
Total	27	49	115	57	39	18	19	8	

3.—*Diseases of the Eye, Ear, and Nose.*

	Cured.		Relieved.		Unrelieved.		Under Treatment.		Registered Fatal Complications, &c.
	M.	F.	M.	F.	M.	F.	M.	F.	
Ophthalmitis	1	..	..	2	..	..	..	..	
Granular ophthalmia	..	5	8	13	..	..	4	..	
Chancre of eyelid	..	..	1	..	..	..	1	..	
Keratitis	2	4	4	2	1	3	2	2	
Ulcer of cornea	..	..	1	1	..	..	..	..	
Opacity of cornea	2	1	9	4	..	1	1	..	
Conical cornea	..	1	1	1	..	..	..	..	
Staphyloma	..	1	1	..	..	..	1	..	
Corneo-iritis	..	1	13	7	1	2	1	5	
Sloughing of cornea	..	..	1	..	3	..	..	..	
Iritis	1	..	9	..	..	..	1	1	
Closed pupil	7	1	13	11	4	4	7	2	
Cancer of iris	..	..	..	..	..	..	1	..	
Choroiditis	..	..	2	1	..	1	1	..	
Amaurosis	..	..	..	1	..	..	1	..	
Hæmorrhage into retina	..	..	1	..	1	..	2	..	
Diseased optic nerve	..	..	..	..	2	1	..	..	
Displaced retina	1	..	..	..	..	1	7	..	
Cataract	41	35	14	9	1	..	..	..	
Cataract, traumatic	1	..	1	..	..	..	1	..	
Ptosis	..	..	1	..	1	..	1	..	
Pannus	1	..	5	..	1	1	..	..	
Glaucoma	2	..	9	5	5	7	..	2	
Injury to eye	1	..	4	2	2	..	4	..	
Inflammation of eyeball	2	..	..	..	..	..	1	..	
Suppuration of eyeball	..	..	..	..	..	..	1	..	
Ectropium	..	..	1	1	..	1	..	..	
Trichiasis	1	1	..	..	..	..	..	..	
Strabismus	3	2	..	..	..	..	..	..	
Contraction of orbit	..	..	..	..	..	..	1	..	
Cancer of eye	..	..	..	..	..	1	..	..	
Blind eye, excision	..	2	..	..	..	..	..	..	
Inflammation of lachrymal apparatus	1	..	3	..	..	..	..	1	
Ear—									
Abscess	1	1	..	..	..	..	..	..	
Deafness	..	..	1	1	..	..	..	..	
Nose—									
Epistaxis	1	..	..	..	..	..	..	..	
Polypus	..	1	2	1	2	..	..	..	
Ozœna	..	..	..	..	1	..	..	..	
Total	69	56	105	62	25	23	33	13	

4.—*Diseases of the Circulatory System, Absorbents, and Glands.*

	Cured.		Relieved.		Unrelieved.		Died.		Registered Fatal Complications, &c.
	M.	F.	M.	F.	M.	F.	M.	F.	
Pericarditis	..	1	..	1	1	..	3	1	
Cardiac dropsy	..	..	1	1	..	..	5	3	
Cardiac dilatation	..	..	1	3	..	..	2	3	Pneumonia.
Valvular disease	..	..	..	9	..	2	4	3	
Cardiac disease	..	1	33	19	4	2	13	9	Pyæmia.
Congenital malformation	..	..	1	..	1	..	..	..	
Palpitation	..	..	1	1	..	..	..	..	
Aortic obstruction	..	..	2	..	2	..	..	..	
Aortic disease	..	..	6	2	3	..	3	1	Meningitis.
Aortic aneurism	..	..	1	..	4	..	6	..	
Innominate aneurism	..	..	1	..	1	..	2	..	Pneumonia.
Popliteal aneurism	1	..	..	..	..	..	1	..	Pyæmia.
Femoral aneurism	..	..	..	..	1	..	1	..	
Axillary aneurism	1	..	..	..	..	..	..	..	
Carotid aneurism	..	..	1	..	..	..	1	..	
Aneurism by anastomosis	..	..	1	..	..	..	..	..	
Phlebitis	..	..	1	..	..	..	..	..	
Phlegmasia dolens	..	..	..	..	..	1	..	..	
Varicose veins	1	..	4	2	2	1	..	..	
Nævus, vascularis	..	..	3	9	..	..	..	..	
Diseased arteries	..	..	..	..	..	..	1	..	
Varicose aneurism	1	..	..	..	..	..	..	..	
Hæmorrhage	1	..	1	..	..	..	..	..	
Thrombosis	1	..	..	..	..	..	..	..	
Inflammation of lymphatics	..	1	4	3	..	..	..	..	
Suppuration of glands	3	..	1	5	..	..	..	..	
Hypertrophy of glands	2	1	1	3	1	1	..	..	
Cancer of glands	..	1	..	..	2	2	..	..	
Goitre	..	..	..	5	..	1	..	..	
Diseased parotid	2	1	1	..	..	..	..	..	
Diseased thyroid	..	..	..	..	..	..	1	..	Pneumonia.
Addison's disease	..	..	1	..	..	1	..	..	
Total	13	6	66	63	22	11	43	20	

5.—*Diseases of the Respiratory Organs.*

	Cured.		Relieved.		Unrelieved.		Died.		Registered Fatal Complications, &c.
	M.	F.	M.	F.	M.	F.	M.	F.	
Croup	1	..	..	..	..	..	2	..	
Laryngitis	1	1	4	5	..	1	..	..	
Laryngeal disease	1	2	2	1	1	..	..	..	
Bronchitis, acute and chronic	17	4	14	5	..	..	5	4	Albuminuria 3.
Pneumonia	13	4	4	1	1	..	7	2	Diseased kidneys and pleurisy 2.
Congestion of lung—Hæmoptysis	1	2	4	2	..	..	..	..	
Emphysema	1	..	2	1	..	..	4	..	
Pleurisy	12	2	4	..	..	..	1	..	
Chronic pleurisy	1	1	5	3	..	..	..	..	
Empyema	..	..	..	..	..	..	1	1	
Gangrene of lung	..	..	..	..	..	1	5	1	
Broncho-pneumonia	2	..	1	..	..	..	1	2	
Pleuro-pneumonia	6	4	4	1	1	..	1	..	
Pneumo-thorax	..	..	1	..	..	..	..	..	
Bronchitis & emphysema	..	..	6	1	1	..	4	1	
Total	56	20	51	20	4	2	31	11	

6.—*Diseases of the Digestive Organs.*

	Cured.		Relieved.		Unrelieved.		Died.		Registered Fatal Complications, &c.
	M.	F.	M.	F.	M.	F.	M.	F.	
Epulis	..	..	1	..	..	..	..	..	
Harelip	2	..	1	1	1	..	..	..	
Cancer of lip	9	..	1	..	..	..	..	..	
Cancer of tongue	..	..	4	..	3	..	3	..	
Cleft palate	..	..	3	..	4	4	1	..	Erysipelas.
Stomatitis	1	..	..	..	..	..	..	..	
Cyst in epiglottis	..	..	1	..	..	..	..	..	
Sore throat	1	3	1	..	..	..	..	..	
Foreign body in throat	..	1	..	..	..	..	..	..	
Cynanche tonsillaris	2	3	..	3	1	..	..	..	
Glossitis	..	..	1	..	..	..	..	..	
Œdema of glottis	..	..	..	..	..	..	1	..	
Stricture of œsophagus	..	..	5	..	..	..	1	..	
Cancer of œsophagus	..	..	..	..	..	..	3	..	
Dysphagia	1	..	2	..	..	..	..	..	
Ulcer of stomach	2	2	3	1	1	..	..	1	
Cancer of stomach	..	..	..	1	1	1	3	1	
Carried forward	18	9	23	6	11	5	12	2	

Diseases of the Digestive Organs—Continued.

	Cured.		Relieved.		Unrelieved.		Died.		Registered Fatal Complications, &c.
	M.	F.	M.	F.	M.	F.	M.	F.	
Brought forward....	18	9	23	6	11	5	12	2	
Hæmatemesis	..	2	..	..	..	..	..	..	
Dis. of stomach, various..	1	1	3	2	..	1	..	1	
Gastritis..............	2	1	1	..	..	..	..	..	
Dyspepsia..............	6	8	5	3	..	..	..	..	
Gastrodynia............	1	1	..	2	..	..	..	..	
Vomiting	2	1	..	1	..	..	..	..	
Dysentery..............	4	2	6	1	..	..	..	..	
Hernia	17	12	6	2	1	2	3	8	
Intussusception	..	..	..	..	..	..	2	..	
Intestinal obstruction....	..	2	..	2	..	..	1	..	Band of intestine.
" ulceration.....	..	..	..	..	..	..	2	..	Perforation.
" strangulation..	..	..	..	..	..	..	1	..	
Diarrhœa	9	2	1	1	..	..	..	..	
Cancer of bowel.........	..	..	2	..	1	1	4	3	
Colic	..	1	1	..	..	..	..	..	
Lead colic..............	9	..	2	..	..	..	..	..	
Copper colic............	1	..	..	..	..	..	..	..	
Constipation............	1	4	1	1	1	..	..	..	
Enteritis...............	1	1	..	..	..	..	..	..	
Anal fistula............	3	3	18	4	1	1	..	..	
Anal fissure............	..	..	1	1	..	..	..	..	
Hæmorrhoids...........	5	2	5	4	1	..	..	..	
Fistula of colon.........	..	..	..	1	..	..	..	..	
Ulcer of rectum.........	..	..	4	6	..	2	..	..	
Stricture of rectum......	..	..	2	3	..	2	..	..	
Abscess of rectum	2	..	3	1	..	..	..	..	
Prolapsed rectum........	..	..	1	..	..	..	..	..	
Imperforate anus........	..	..	1	..	..	..	..	..	
Congestion of liver......	1	..	1	..	1	..	..	1	
Cirrhosis of liver........	..	..	4	2	..	..	7	5	
Hydatid of liver........	2	1	2	1	..	2	..	1	
Cancer of liver..........	..	..	..	1	..	1	1	2	
Tumour of liver	..	..	1	..	..	..	..	..	
Abscess of liver.........	..	..	1	..	..	..	1	..	
Atrophy of liver........	..	..	..	..	..	..	1	1	
Jaundice	1	5	3	2	..	..	..	..	
Gall stones.............	1	1	..	..	..	..	..	..	
Hypertrophy of spleen...	..	..	..	1	1	..	..	..	
Peritonitis	1	3	1	2	1	..	3	1	
Ascites.................	..	1	1	4	..	1	1	2	Lead poisoning.
Abdominal tumour.......	..	..	..	5	2	4	..	..	
Lardaceous disease......	..	..	..	..	..	..	..	1	
Total............	88	63	100	59	21	22	39	28	

7.—*Diseases of the Urinary Organs.*

	Cured.		Relieved.		Unrelieved.		Died.		Registered Fatal Complications, &c.
	M.	F.	M.	F.	M.	F.	M.	F.	
Bright's disease.........	8	6	17	11	5	2	21	11	Pleurisy 4, laryngitis, purpura, hydrothorax, dis. liver, lardaceous viscera.
Scarlatinal dropsy	2	3	4	2	..	..	..	..	
Pyelitis	..	..	2	..	..	..	3	..	Phthisis, pyæmia, Peritonitis.
Renal cystitis...........	..	..	1	..	1	..	..	..	
Displaced kidney........	..	..	..	..	..	1	..	..	
Renal calculus...........	..	..	1	1	..	..	..	..	
Hæmaturia renalis.......	6	..	5	..	..	1	..	..	
Cystitis.................	1	4	5	4	2	..	1	1	Peritonitis, enteritis
Vesical calculus	7	..	..	..	..	1	1	..	(Scarlatina).
Cancer of kidney.........	..	..	..	..	..	..	1	..	Cancer of liver.
Malformed bladder.......	..	..	..	..	3	..	1	..	
Diseased bladder	..	..	1	..	1	2	..	..	
Tumour in bladder.......	..	..	..	..	..	..	1	..	Hæmorrhage.
Incontinence of urine....	1	..	..	..	2	3	..	..	
Retention of urine......	2	..	2	1	..	..	1	..	Suppression of kidneys.
Diseased prostate gland..	..	..	6	..	1	1	2	..	
Stricture of urethra......	20	..	85	..	9	..	14	..	Cystitis 3, nephritis 2, pyelitis 3, bronchitis, erysipelas, septicæmia 2.
Urethral calculus	3	..	..	..	..	..	..	..	
Irritable bladder.........	..	..	3	..	1	..	..	..	
Urinary abscess	..	..	1	..	..	..	..	..	
Urinary fistula...........	1	..	2	..	1	..	..	..	
Phymosis	18	..	3	..	2	..	1	..	Erysipelas.
Sloughing scrotum and penis	1	..	1	..	1	..	..	..	
Cancer of scrotum and penis	..	..	1	..	1	..	..	..	
Hydrocele...............	6	1	13	..	..	..	..	..	
Hydrocele of cord.......	..	..	1	..	1	..	..	..	
Varicocele	..	..	1	..	..	..	..	..	
Orchitis.................	3	..	9	..	..	..	..	..	
Diseased testicle........	3	..	2	..	..	..	..	..	
Hydrocele with hernia...	..	..	..	..	1	..	..	..	
Total............	82	14	166	19	32	11	47	12	

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8.—*Diseases of the Female Organs of Generation and Breast.*

	Cured.		Relieved.		Unrelieved.		Died.		Registered Fatal Complications, &c
	M.	F.	M.	F.	M.	F.	M.	F.	
Encysted ovarian dropsy.	..	..	..	3	..	4	..	3	
Diseased ovaries	..	4	..	11	..	5	..	4	
Cancer of ovary.........	..	..	..	..	..	..	..	2	
Pelvic cellulitis.........	..	9	..	5	..	..	..	3	
Pelvic hæmatocele......	..	3	..	4	..	..	..	..	
Leucorrhœa............	..	1	..	4	..	..	..	..	
Abrasion of cervix......	..	1	..	2	..	..	..	..	
Ulcer of cervix	..	..	..	1	..	..	..	..	
Hypertrophy of uterus...	..	1	..	1	..	..	..	..	
" cervix ..	..	1	..	..	..	1	..	..	
Adherent placenta......	..	1	..	..	..	..	..	..	
Uterine polypus.........	..	9	..	..	..	..	..	..	
Anteversion.......... ..	..	1	..	3	..	..	..	..	
Retroversion	..	2	..	16	..	..	..	..	
Prolapsus...............	..	1	..	1	..	1	..	..	
Vesico-vaginal fistula....	..	1	..	6	..	1	..	..	
Cancer of vagina	..	..	..	2	..	..	..	..	
Closure of vagina........	..	2	..	..	..	..	..	..	
Vascular tumour on meatus............	..	1	..	..	..	..	..	..	
Amenorrhœa...........	..	2	..	2	..	..	..	..	
Vicarious menstruation..	..	3	..	1	..	..	..	..	
Dysmenorrhœa.........	..	1	..	4	..	4	..	..	
Menorrhagia	..	3	..	4	..	..	..	..	
Menstruation into abdominal cavity........	..	..	..	1	..	..	..	..	
Uterine hæmorrhage....	..	..	..	1	..	..	..	..	
Pregnancy...............	..	5	..	1	..	1	..	..	
Abortion	..	1	..	..	..	..	..	1	Pyæmia.
Premature induction of labour..................	..	3	..	3	..	..	..	..	
Extra-uterine pregnancy.	..	..	..	..	..	..	..	1	
Ruptured perineum......	..	..	..	..	..	3	..	..	
Metritis.................	..	1	..	2	..	..	..	..	
Cancer of womb........	..	1	..	21	..	3	..	5	
Uterine tumours	..	2	..	7	..	1	..	..	
Puerperal toxæmia......	..	..	..	2	..	..	..	..	
Abscess of breast	..	3	..	1	..	..	..	..	
Cancer of breast........	..	15	..	10	..	..	..	5	
Glandular tumour of breast.............	..	3	..	..	..	1	..	..	
Encysted tumour of breast	..	1	..	..	..	..	..	..	
Other tumours of breast..	..	2	..	..	..	2	..	..	
Total........	..	84	..	119	..	27	..	24	

9.—*Diseases of the Organs of Locomotion.*

	Cured.		Relieved.		Unrelieved.		Died.		Registered Fatal Complications, &c.
	M.	F.	M.	F.	M.	F.	M.	F.	
Bones—									
Ostitis	1	1	24	7	7	4	..	..	
Periostitis	2	..	4	4	..	..	1	..	Pyæmia.
Caries of face and jaw	..	1	5	2	3	1	1	..	Abscess of brain.
" bones of foot	1	..	4	3	..	..	1	..	Erysipelas.
" bones of hand	..	..	3	1	..	..	..	..	
" ilium	..	..	1	3	..	..	..	..	
" tibia	1	..	1	..	..	..	..	..	
Necrosis of cranium	..	..	..	1	..	..	..	..	
" face and jaw	..	..	3	3	..	..	..	..	
" humerus	..	..	3	..	..	..	..	..	
" hand	1	1	5	..	..	..	1	..	Embolism.
" foot	..	..	2	..	..	..	..	..	
" tibia	1	1	18	6	2	2	1	1	Pyæmia 2.
" fibula	..	..	2	..	1	..	..	..	
" femur	..	..	3	1	1	2	1	2	Pyæmia, lardaceous viscera, dis. kidneys.
" pelvis	..	..	2	2	..	..	..	..	
" ribs	..	..	..	2	..	..	..	..	
Exostosis	1	1	2	1	..	..	..	..	
Cancer of bone	..	..	1	..	..	..	2	1	Cystitis, gangrene.
Joints—									
Acute synovitis	3	2	6	3	..	..	..	..	
Chronic synovitis	..	..	2	2	..	..	..	..	
Loose cartilage in knee	..	..	2	..	..	1	..	..	
Diseased knee-joint	11	5	38	20	3	3	9	3	Pyæmia 4, morbus Brightii 2, phthisis 2, bronchitis, pericarditis.
" hip	3	1	25	27	8	3	2	..	Pyæmia (Pyæmia), Erysipelas after operation.
" ankle	..	1	..	3	1	..	..	..	
" shoulder	..	..	1	..	..	1	..	..	
" elbow	1	1	6	1	..	..	1	1	Pneumonia.
" wrist	..	..	2	..	..	1	..	1	
Spine—									
Caries of	..	..	6	4	3	3	4	..	Lard. viscera, abs.
Necrosis of	..	..	..	..	..	..	..	2	Pyæmia, Lumbar abscess.
Lateral curvature	..	..	2	..	..	2	..	..	
Angular deformity	..	..	..	..	1	1	..	..	
Muscles and tendons—	..	..	..	..	..	..	..	..	
Progressive muscular atrophy	1	..	3	3	1	1	2	..	Variola.
Separation of biceps	..	..	..	..	1	..	..	..	
Contraction of tendons	..	1	2	2	1	..	..	..	
Relaxed tendons	..	..	2	..	..	1	..	..	
Club foot, varus	..	..	2	1	..	..	..	..	
" equinus	..	..	4	..	1	..	..	..	
Enlarged bursa patella	3	13	1	5	..	..	..	..	
Suppuration of bursa patella	4	3	..	..	..	..	..	..	
Ganglion	1	..	1	3	..	1	..	..	
Inflamed bunion	..	..	1	..	..	..	..	..	
Total	35	32	189	110	34	27	26	11	

10.—*Diseases of Cellular Tissue and Skin.*

	Cured.		Relieved.		Unrelieved.		Died.		Registered Fatal Complications, &c.
	M.	F.	M.	F.	M.	F.	M.	F.	
Inflammation of cellular tissue	7	2	6	5	..	1	..	..	
Abscess of head and neck	..	1	1	3	2	..	..	..	
" upper extremity	2	..	2	1	..	..	1	..	Erysipelas.
" lower extremity	9	4	5	4	..	3	..	1	Pyæmia.
" chest and abdomen	2	1	4	2	2	..	..	..	
" back and pelvis	6	3	6	3	1	2	2	1	
Slough and gangrene	1	1	1	1	1	..	3	..	
Sinus, various	..	..	1	..	1	..	..	..	
Thecal abscess	1	2	1	4	..	..	..	..	
Skin—									
Diffuse inflammation of skin	1	1	2	1	..	..	..	..	
Erythema	..	..	1	..	..	..	..	..	
Psoriasis and lepra	3	2	..	3	1	..	1	..	
Eczema	4	5	7	2	2	..	..	..	
Rupia	..	..	..	1	..	..	..	..	
Alopecia and onychia congenital	..	..	1	1	..	..	..	..	
Scabies	1	3	1	..	..	..	..	..	
Herpes	..	2	..	..	..	..	..	..	
Cancer of skin	..	1	1	..	1	..	..	..	
Ulcer of leg	33	25	25	33	11	1	..	2	(Erysipelas). Diseased kidneys, visceral disease.
Ulcer of other parts	5	3	11	4	..	..	1	..	Pyæmia.
Carbuncle	2	..	1	..	..	..	1	..	Pyæmia.
Onychia	..	1	..	2	1	..	..	..	
Thecal inflammation	1	..	..	..	..	..	..	..	
Cicatrices from burns	..	..	..	2	..	1	..	..	
" other causes	..	..	..	2	..	..	..	..	
Supernumerary fingers	..	2	..	..	..	..	..	..	
Supernumerary toes	1	..	..	..	..	..	..	..	
Total	79	59	77	74	23	8	9	4	

11.—*Miscellaneous Returns.*

	Cured.		Relieved.		Unrelieved.		Died.		Registered Fatal Complications, &c.
	M.	F.	M.	F.	M.	F.	M.	F.	
Debility	3	6	..	4	..	..	..	..	
Malingering	1	..	..	..	1	..	..	..	
Destitution and want	3	1	2	..	..	..	..	..	
Effects of revaccination	..	1	..	..	..	..	..	..	
Obesity	..	..	..	1	..	..	..	..	
Disease unascertained	..	..	..	..	1	1	..	1	
No disease	1	1	..	..	..	..	..	..	
Total	8	9	2	5	2	1	..	1	

12.—*Poisons and General Injuries.*

	Cured.		Relieved.		Unrelieved.		Died.		Registered Fatal Complications, &c.
	M.	F.	M.	F.	M.	F.	M.	F.	
Mineral Poisons—									
Oxalic acid	..	2	..	..	..	..	..	..	
Sulphuric acid	..	1	..	..	..	..	..	..	
Nitric acid	..	..	..	..	..	..	1	..	
Ammonia	..	1	..	..	..	..	1	..	
Prussic acid	1	..	..	..	..	..	..	..	
Paraffin	..	1	..	..	..	..	..	..	
Vegetable Poisons—									
Depilatory powder	..	1	..	..	..	..	..	..	
Poisoned mushrooms	..	1	..	..	..	..	1	..	
Atropine	..	1	..	..	..	..	..	..	
Alcoholism	12	..	2	1	..	..	..	..	
Poisoned wound	..	1	..	..	..	..	..	..	
General Injuries—									
Burns and scalds	5	4	3	4	1	..	11	4	Pyæmia, pneumonia (measles), (loss of vision).
" from sulphuric acid	..	..	1	..	..	..	..	..	
" from carbolic acid.	1	..	..	..	..	..	..	..	
Multiple injury	1	..	..	1	..	..	1	..	
Asphyxia, drowning	7	1	..	..	..	..	1	..	
General contusions	3	1	1	..	..	..	..	..	
Total	30	15	7	6	1	..	1	4	

13.—*Local Injuries.*

	Cured.		Relieved.		Unrelieved.		Died.		Registered Fatal Complications, &c.
	M.	F.	M.	F.	M.	F.	M.	F.	
Head and face—									
Contusions of head and face..........	3	1	2	3	..	..	1	..	Pyæmia.
Wounds of face.......	7	..	2	1	..	..	1	..	Tetanus.
Scalp wounds........	15	1	17	3	1	..	4	2	Pyæmia 3, erysipelas, (small-pox), (erysipelas 2), (erysipelas).
Concussion of brain...	51	5	5	..	..	..	..	..	
Fractured skull	3	..	..	..	..	..	11	3	Tetanus, hæmorrhage 2.
Fractured base of skull	5	..	1	..	..	..	4	..	
Fractured jaw.........	2	..	3	..	..	..	..	1	Chloroform and fatty heart.
Neck—									
Contusions...........	6	2	1	..	..	..	..	..	
Cut throat............	3	1	..	..	..	..	3	..	
Chest—									
Contusion of chest....	9	2	3	..	..	..	1	..	(Septicæmia) shock of injury.
Fractured ribs.........	3	2	1	1	..	..	1	..	Pleurisy.
" with injured lungs	8	..	1	..	..	..	3	2	Ruptured abdominal viscera 2.
Gunshot wound of chest	1	..	..	..	..	..	..	..	
Fractured clavicle.....	1	1	1	..	..	..	..	..	
Back—									
Contusion	7	3	3	1	..	..	..	..	
Wounds...............	2	..	1	..	..	..	..	..	
Fracture and dislocation of spine......	..	..	..	..	..	..	10	..	
Concussion of spine....	6	1	1	1	..	..	..	..	
Abdomen—									
Contusion	12	4	..	1	..	..	..	..	
Wound...............	2	1	..	1	..	1	..	..	
Ruptured viscera......	1	..	..	..	..	..	5	1	
Pelvis—									
Contusions...........	4	..	1	..	..	..	..	..	
Wound of perineum...	4	3	1	..	..	..	..	..	
Ruptured perineum....	1	..	..	3	..	3	1	..	Pyæmia.
Fractured pelvic bones.	5	..	..	..	..	..	2	..	
Upper extremity—									
Contusions...........	1	1	4	..	..	..	..	..	(Erysipelas 2).
Wounds	17	1	7	4	..	..	5	..	Tetanus 2, hæmorrhage, (erysipelas 2).
Injury to shoulder....	1	..	2	1	..	..	1	..	
" elbow......	2	1	..	..	..	..	1	..	Pneumonia.
" wrist.......	1	..	1	..	..	..	..	..	
Fracture of clavicle....	..	..	..	1	..	..	..	..	
" humerus ..	6	5	..	..	..	..	1	..	
Co. fracture, humerus..	3	..	5	..	..	..	3	..	Gangrene.
Fracture of forearm....	..	2	2	1	..	..	..	..	
Co. fracture, forearm..	2	..	2	..	..	..	..	..	
" bones of hand	9	2	3	1	1	..	..	..	
Dislocation of humerus	1	..	2	1	1	..	..	..	
" patella...	..	..	1	..	..	..	..	..	
" hip.....	4	1	..	..	..	..	..	..	
Displaced tibia........	..	..	1	..	..	..	..	..	

Local Injuries—Continued.

	Cured.		Relieved.		Unrelieved.		Died.		Registered Fatal Complications, &c.
	M.	F.	M.	F.	M.	F.	M.	F.	
Upper extremity—									
Co. dislocation, thumb.	1	..	..	..	..	..	..	..	
Lower extremity—									
Dislocation of ankle...	..	1	..	..	..	..	..	..	
Contusion...........	13	3	3	3	1	..	..	..	
Wounds.............	13	1	7	..	..	..	..	..	(Erysipelas 2).
Injury to hip.........	3	1	2	..	..	..	..	..	(Smallpox).
" knee........	11	1	4	1	..	..	1	..	
" ankle	11	2	8	4	1	..	..	..	(Delir. tremens).
Fracture of femur.....	51	16	1	1	1	..	..	1	Cancer.
Co. fracture of femur..	..	1	..	..	..	..	3	..	Pyæmia.
Fracture of neck of thigh	4	2	1	4	..	..	..	..	
Fracture of patella....	10	3	5	4	..	..	..	..	
Co. fracture of patella.	..	..	..	..	..	..	1	1	Exhaustion, pyæmia.
Fracture, tibia and fibula	92	22	2	..	..	..	1	1	
Co. frac. "	26	6	3	1	..	1	6	2	Pyæmia 1, shock 1, (pyæmia).
Fracture of fibula only.	31	6	..	..	..	..	1	..	Pyæmia.
Fractured bones of foot.	1	..	..	..	..	..	1	..	Pyæmia.
Co. fract. " ..	2	..	..	..	..	..	..	..	
Ununited fracture, humerus, ...	1	..	2	..	..	..	..	..	
Ununited fract., femur.	..	..	..	1	..	..	..	..	
" " tibia ..	1	..	..	..	..	..	..	..	
Total............	479	105	112	43	6	4	72	14	

Causes of the Various Accidents admitted in 1871, *with the Mortality.*

CAUSES OF THE ACCIDENTS.	Total cases.	Discharged.		Died.		Remaining.	
		M.	F.	M.	F.	M.	F.
Accidents on the river........................	47	34	1	4	..	8	..
Assaults, personal............................	20	11	5	2	1	..	1
Attempts at suicide...........................	17	9	2	5	..	1	..
Bites and kicks from animals..................	12	9	..	2	..	1	..
Burns from clothes taking fire................	23	2	3	7	4	3	4
" from heated fluids......................	11	5	3	..	..	3	..
" from explosion of gas...................	2	1	1	..	..	..	..
" from gunpowder..........................	3	1	1	1	..	..	..
Collisions between forces.....................	15	6	2	4	..	3	..
Collisions with street vehicles...............	109	69	19	10	4	3	4
Cuts and blows................................	45	30	9	1	2	1	2
Falls down stairs.............................	41	11	24	4	1	..	1
Falls from a height...........................	205	161	11	15	3	15	..
Falls on the ground...........................	183	118	31	9	..	20	5
Falls of heavy weights........................	65	57	1	3	1	3	..
Foreign bodies in internal passages...........	6	6	..	..	..	..	..
Gunshot wounds................................	5	5	..	..	..	..	..
Machinery accidents...........................	28	21	..	4	..	3	..
Poisoning, accidental.........................	7	..	6	1	..	..	..
Poisoning, intentional........................	5	1	2	2	..	..	..
Railway accidents.............................	30	14	2	11	..	3	..
Torsions of the body..........................	13	7	4	..	1	..	1
Total.........................	892	578	127	85	17	67	18

Miscellaneous Operations.

	Cured.		Unrelieved.		Dead.		Fatal Complications.	Remarks.
	M.	F.	M.	F.	M.	F.		
Excision of Diseased Parts—								
Mammary tumours, cancerous	..	24	..	..	..	2	Pleurisy, exhaustion	
" adenocele	..	4	..	..	..	..	..	
" encysted	..	2	..	..	..	..	..	
Cancerous lip	11	..	..	..	..	..	..	
" tongue	3	..	..	..	2	..	Gangrene of lung, bronchitis	Galvanic cautery.
Cancer of other parts	8	..	1	..	1	..	Extension of disease	Face 4, side 2, breast 2, arm 1, anus 1.
Non-malignant tumours—								
Fibrous	3	3	..	..	..	..	..	Face, lobes of ears, hand, hip, thigh, and leg.
Encysted	4	7	..	..	1	..	Bronchocele	Face 5, throat 2, jaw 2, mouth 1.
Enchondroma	2	1	..	..	..	..	..	Finger, neck, orbit.
Calcareous	1	1	..	..	..	..	..	Temple, penis.
Glandular	2	1	..	..	..	..	..	Neck 3.
Fatty	1	3	..	..	..	1	Septicæmia	Arm 2, neck, face, side.
Vascular	..	1	..	..	..	..	..	Thigh.
Growth in throat	2	2	..	..	..	..	..	Pharynx, trachea.
Excision of knee-joint	1	1	..	..	..	..	..	Diseased joint.
" elbow-joint	2	1	..	..	2	..	Gangrene, phthisis	Disease 3, compound fracture 2.
" penis	2	..	..	..	..	..	..	Cancer.
" testicle	5	..	..	..	..	..	..	Tubercular 2, cystic dis. 2, syphilitic 1.
Excision of Diseased Bones—								
Pelvic bones	1	2	..	..	..	..	..	Necrosis, ilium 2, pubis 1.
Femur	5	..	1	..	2	1	Erysipelas, pyæmia, diseased kidneys	Necrosis 7, ostitis 2.
Tibia	17	..	..	..	..	..	..	Necrosis 10, compound fracture 4, ostitis 2, exostosis 1.
Fibula	2	..	..	..	..	..	..	Necrosis.
Bones of foot	9	2	..	..	..	..	..	Caries and necrosis.
Humerus	4	1	..	..	..	..	..	Necrosis.
Bones of hand	4	..	..	..	..	..	..	Necrosis 2, exostosis, co. fracture 1.
Bones of face	..	..	1	..	..	..	..	Malar bones.
Jaw (1 upper and 4 lower)	2	2	..	..	1	1	Extension of disease	Necrosis 2, fibula growth 2, dental cystitis, compound fracture.
Rib	..	1	..	..	..	..	..	Exostosis.
Cranial bones	..	..	..	..	2	1	Meningitis, hæmorrhage, injury	Elevation and removal of frac. bones.

Excision of nævus	1	2	..	..	..	..	..	Back, side, face.
Neuroma	1	..	..	..	..	..	..	Stump of arm.
Ligature of arteries—								
External iliac	..	..	..	..	1	..	Peritonitis	Femoral aneurism.
Femoral	1	..	..	..	1	..	Pyæmia	Popliteal and femoral aneurism.
Right subclavian and com. carotid	..	..	..	..	1	..	Exhaustion	Innominate aneurism.
Left carotid	..	..	..	..	1	..	Suppuration of sac	Aneurism of carotid.
Right subclavian	1	..	..	..	..	..	..	Thoracic aneurism.
Cirsoid aneurism	1	..	..	..	..	..	..	Face.
Pressure for femoral aneurism	..	..	3	..	..	..	..	
Perineal section	9	..	..	..	4	..	Septicæmia 2, exhaustion 2	Stricture 8, fistula 3, injury 1, abscess 1.
Puncture of bladder	4	..	..	..	2	..	Hæmorrhage, abscess of kidney	Stricture.
Urethrotomy	1	..	..	..	..	..	..	Calculus.
Lithotomy	6	..	..	..	1	..	Pelvic cellulitis	
Operation as for lithotomy	1	..	..	..	..	..	..	Recto-vesical fistula.
Reduced dislocation	1	..	..	..	..	..	..	Humerus, 3 weeks.
Tenatomy	4	..	..	..	..	..	..	Double talipes 2, single 2.
Reparatory Operations—								
Cicatrices from burns	..	2	..	..	..	..	..	Arm 1, neck 1.
Malformed bladder	..	..	1	..	1	..	..	Extraversion.
Harelip	8	..	..	..	1	..	Erysipelas	
Cleft palate	1	..	1	1	..	..	..	
Recto-vaginal fistula	..	1	5	1	..	..	..	
Fæcal fistula	..	1	..	..	..	..	..	
Ruptured perineum	..	4	..	..	..	..	..	
Colotomy	1	..	..	..	1	..	Cancer and abscess	
Ovariotomy	..	3	..	..	..	3	Peritonitis	
Exploration of kidney	..	..	..	1	..	..	..	Supposed calculus.
Tracheotomy	..	..	..	..	4	1	Morbus Brightii 1	Laryngitis 3, croup 1, dis. larynx 1.
Trephining tibia	1	..	..	..	..	..	..	Ostitis.
Operations for Hernia—								
Umbilical—taxis	..	1	..	..	..	..	..	Sac not opened.
Exploratory	..	1	..	..	..	..	..	
Inguinal hernia, radical cure	1	..	..	..	..	..	..	
Reduced by taxis	13	4	..	..	1	..	Peritonitis	
Herniotomy	4	..	..	..	1	..	..	Sac opened in all.
Femoral hernia, taxis	2	4	..	..	..	..	..	
" herniotomy	..	1	..	..	1	6	..	Sac opened.
" "	2	3	..	..	..	1	..	Sac not opened.
Total	155	86	13	3	32	17		

Operation List.—Table of Amputations.

AMPUTATIONS.	Total. M & F.	Ages of Cured.	Ages of Deaths.	Cured. M.	Cured. F.	Dead. M.	Dead. F.	FATAL COMPLICATIONS.
PRIMARY, FOR INJURY.								
Shoulder-joint,	1	19	..	1	..	..	..	
Arm,	5	2½, 54	31, 14, 57	2	..	3	..	Ruptured liver. Shock.
Hand,	1	23	..	1	..	..	..	
Fingers,	5	..	..	3	2	..	..	
At Hip-joint,	1	..	10	..	..	1	..	Pyæmia.
Thigh,	4	33, 14	28, 47	2	..	2	..	Shock.
Thigh and Leg,	1	..	30	..	..	1	..	The accident.
Through Knee-joint,	2	38, 8	..	1	1	..	..	
Leg,	3	23, 29, 62	..	3	..	..	..	
Foot (Chopart),	1	30	..	1	..	..	..	Pyæmia.
Foot (Pirigoff)	1	..	28	..	..	1	..	Pyæmia.
SECONDARY, FOR INJURY.								
Through Knee-joint,	1	38	..	1	..	..	..	
Thigh,	2	..	38, 52	..	..	2	..	Pyæmia. Surgical fever.
SECONDARY, FOR DISEASE.								
Arm,	3	8, 45	77	..	2	..	1	Pneumonia.
Thumb,	1	..	..	1	..	..	..	
Fingers,	7	..	..	4	3	..	..	
Thigh,	25	4, 5, 8, 9, 14, 15, 15, 17, 23, 27, 22, 28, 30	7, 18, 22, 22, 29, 22, 35, 38, 49, 62, 58, 45	10	3	11	1	Phthisis, 3. Gangrene, 2. Pyæmia, 2. Morbus Brightii. Bronchitis. Pericarditis. Lardaceous disease.
Knee-joint,	3	30, 38	39	1	1	..	1	Diseased liver and kidneys.
Leg,	6	12, 12, 32, 52	43, 70	3	1	2	..	Pyæmia. Gangrene.
Toes,	2	16	35	1	..	1	..	Erysipelas.
	75			35	13	24	3	

Operations on the Eyes, Compiled by Mr. R. J. Pye Smith.

Operations.	IN-PATIENTS. Eye.			IN-PATIENTS. Result.				OUT-PATIENTS. Eye.			Total Operations.
	Right.	Left.	Both.	Cured.	Relieved.	Unrelieved.	Under Treatment	Right.	Left.	Both.	
Eyelids—											
Ectropion	..	..	..	..	..	..	..	1	..	..	1
Entropion	2	..	1	..	2	1	..	..	..	7	18
Enlargement of palpebral aperture	..	..	..	..	..	..	..	1	1	1	4
Closure of palpebral aperture, partial	..	..	..	..	..	..	..	..	2	..	2
Closure of palpebral aperture, complete	..	..	..	..	..	..	..	1	1	1	4
Removal of roots of upper eyelashes	..	..	..	..	..	..	..	..	..	1	2
Nævus	..	..	..	..	..	..	..	..	1	..	1
Conjunctiva—											
Burn	..	..	..	..	..	..	..	..	1	..	1
Removal of tumours	..	..	..	..	..	..	..	1	2	..	3
Lachrymal apparatus—											
Closure of the tear puncta	..	..	..	..	..	..	..	..	..	3	6
Opening of lachrymal sac	1	..	..	..	..	..	1	..	1	..	2
Destruction of lachrymal sac	2	1	1	1	3	..	..	..	1	..	6
External muscles of eyeball											
Strabismus, convergent	1	..	3	4	..	..	..	10	8	37	99
" divergent	..	1	..	1	..	..	..	7	5	2	17
Cornea—											
Scraping	..	..	..	..	..	..	..	1	1	..	2
Removal of opacity	..	1	..	..	1	..	..	..	..	..	1
Paracentesis	..	..	..	..	..	..	..	2	..	..	2
Conical cornea	1	1	1	1	2	..	..	..	..	..	4
Iris—											
Artificial pupil	6	4	2	5	3	2	2	9	7	3	36
Iridectomy	24	18	30	7	32	18	15	34	24	42	244
Removal, entire	3	3	3	1	6	2	..	3	4	5	29
Division of ciliary muscle	..	..	..	..	..	..	..	1	..	..	1
Crystalline lens—											
Removal (for glaucoma)	..	2	..	..	2	..	..	..	1	..	3
Cataract, common extraction	10	1	5	14	2	..	..	..	..	..	21
Cataract, iridectomy extraction	15	15	27	42	14	1	..	1	2	..	87
Cataract, Dr. Taylor's method	..	1	..	1	..	..	..	..	..	..	1
Cataract, linear extraction	6	4	4	12	2	..	..	1	..	..	19
Cataract, absorption	5	4	6	8	6	..	1	3	3	3	33
Opaque capsule removal	..	..	..	..	..	..	..	2	1	..	3
" tearing	..	..	..	..	..	..	..	2	1	..	3

Operations on the Eyes—Continued.

Operations.	IN-PATIENTS.							OUT-PATIENTS.			Total Operations.
	Eye.			Result.				Eye.			
	Right.	Left.	Both.	Cured.	Re-lieved.	Unre-lieved.	Under Treat-ment.	Right.	Left.	Both.	
Eyeball—											
Staphyloma	1	2	..	1	1	..	1	..	1	..	4
Removal of foreign body	..	1	..	..	1	..	..	..	1	..	2
Abscission	..	..	..	..	..	..	..	2	..	..	2
Excision	2	3	..	4	1	..	..	6	3	..	14
Excision of stump	..	..	..	..	..	..	..	1	..	..	1
Total	79	62	83	102	78	24	20	89	72	105	
	307*							371*			678

The results of the Operations on Out-patients do not appear, as they are to a great extent unobtainable. The numerous minor operations for Tarsal Tumours, Epiphora, &c., are not recorded.

* The operations performed upon both eyes are counted as two operations.

Retrospective Summary of Patients Relieved during the Year 1871.

	Males.	Females.	Total.
Patients under treatment in the wards	3,350	2,199	5,549
Out-patients—			
Surgical, ordinary	1,905	1,978	3,883
Medical, ordinary	1,490	1,726	3,216
Diseases of women	..	1,740	1,740
Diseases of the eyes	1,708	1,949	3,657
Diseases of the ear	572	690	1,262
Diseases of the skin	548	541	1,089
Medical casual or slight cases	3,479	6,937	10,416
Surgical casual or slight cases	19,644	18,153	37,797
Minor accidents and other surgery cases	3,934	1,870	5,804
Tooth extractions	1,012	943	1,955
Midwifery patients	..	2,240	2,240
Total	37,642	40,966	78,608

OUT-PATIENT DEPARTMENT, 1871.

The following numbers include such patients as were furnished with cards and prescription papers, to enable them to continue their attendance for a period of two months:—

	Males.	Females.	Total.
Ordinary medical cases	1,490	1,726	3,216
Ordinary surgical cases	1,905	1,978	3,883
Diseases peculiar to women	..	1,740	1,740
Diseases of the eyes	1,708	1,949	3,657
Diseases of the skin	548	541	1,089
Diseases of the ear	572	690	1,262
Total	6,223	8,624	14,847

Besides the above, there were prescribed for in the Out-patient rooms by the house physicians and senior students—

	Males.	Females.	Total.
Medical patients	3,479	6,937	10,416
Surgical patients	19,644	18,153	37,797
Total	23,123	25,090	48,213

The number of minor accidents and other urgent cases attended to in the surgery, and not admitted to the wards, was 5,804—of which
3,934 were men, and 1,870 were women and children.

The dental cases attended to in the surgery were 1,955—of which 1,012 were males, and 943 were females.

The number of women confined, and attended by the students at their respective homes, was 2,240.

DETAILS OF MIDWIFERY DEPARTMENT.

Number of women confined during the year		2,240
Number of single births, 2,220; twin births, 20. Total children		2,260
Living male children	1,141	
Living female children	1,033	
Dead males	50	
Dead females	36	
		2,260

Of the above children 2180 presented naturally at birth, 44 were cases of breech presentation, 11 footling, 10 hand, 8 face, 5 funis, 1 transverse, and 1 placenta previa.

Version was had recourse to in 6 cases, long forceps in 8, and the vectis in one case.

Among the mothers 8 deaths are reported to have arisen from the following causes—puerperal fever 2, post partum hæmorrhage 2, ruptured uterus 1, peritonitis 1, small-pox 1, tumour of brain 1.

Among the mothers there were in their

1st confinement	321	Brought forward	2,119
2nd "	331	10th confinement	51
3rd "	341	11th "	32
4th "	300	12th "	21
5th "	257	13th "	9
6th "	199	14th "	3
7th "	173	15th "	1
8th "	121	16th "	2
9th "	76	17th "	2
	2,119	Total	2,240

Retrospective Summary of all the Patients Treated in Guy's Hospital since 1862.

	1862.	1863.	1864.	1865.	1866.	1867.	1868.	1869.	1870.	1871.
IN-PATIENTS.										
Under treatment during the year	5,371	5,507	5,511	5,715	5,510	5,245	5,297	5,164	5,123	5,549
Discharged well or convalescent	2,443	2,500	2,538	2,622	2,389	2,109	2,237	1,682	1,673	1,832
Relieved	1,525	1,539	1,504	1,633	1,515	1,532	1,551	2,047	2,057	2,203
Unrelieved	346	367	419	400	390	483	411	470	396	422
Discharged for special reasons	87	89	61	71	189	146	116	..	..	..
Died	468	486	480	488	534	509	466	496	498	555
Rate of mortality per cent	9·61	9·75	9·58	9·35	10·64	10·65	9·72	10·56	10·76	11·07
Average number daily resident	494	505	497	501	496	502	498	487	486	529
Mean residence of each in days	33·57	33·47	32·92	31·99	32·85	34·93	34·31	34·42	36·92	37·58
Number of accident cases admitted	810	866	875	1,051	907	911	805	788	821	892
Number of deaths from accident	94	100	109	102	97	101	83	76	91	85
Number of ordinary operations registered	315	314	301	337	342	362	417	314	345	316
Number of deaths after operations	44	62	66	65	60	69	70	51	63	76
Number of ophthalmic operations	226	501	492	656	606	638	624	499	441	678
OUT-PATIENTS.										
Surgical cases	3,025	3,403	3,851	3,749	3,807	4,125	3,905	3,655	3,350	3,883
Medical cases	3,769	3,905	3,731	2,987	3,129	3,438	3,456	3,380	3,330	3,216
Diseases of the eyes	2,812	2,348	2,477	2,312	2,461	2,914	3,614	3,775	3,580	3,657
Diseases peculiar to women	1,899	1,753	1,762	1,635	1,703	1,736	1,675	1,708	1,827	1,740
Diseases of the skin	..	232	493	847	684	801	1,048	1,047	1,055	1,089
Diseases of the ear	..	394	767	826	731	757	960	913	929	1,262
Casual or minor medical cases	7,466	10,140	10,347	9,747	10,045	10,414	10,679	11,152	11,086	10,416
Casual or minor surgical cases	33,210	39,380	38,375	23,446	32,827	37,985	41,159	38,820	38,134	37,797
Tooth extractions	4,821	4,544	5,299	4,789	5,141	4,748	3,655	1,976	2,589	1,955
Minor accidents	4,376	3,838	6,109	6,500	6,030	6,444	6,390	7,319	8,585	5,804
Women confined at their own homes	1,691	1,576	1,608	1,568	1,585	1,727	1,783	1,929	2,183	2,240

STATISTICAL ACCOUNT

OF THE

PATIENTS TREATED IN GUY'S HOSPITAL

DURING 1872.

By J. C. STEELE, M.D.

In accordance with annual custom I beg to submit for your approval the accompanying numerical analysis, illustrative of the practice of the Hospital during the year 1872.

In the following tables the amount of medical relief furnished to the sick poor during the year has been tabulated and arranged so as to embrace every curative department of the Hospital, but, on account of its greater value and importance, the main bulk of the details has special reference to the indoor practice.

The total number of persons entered on the registers during the year just elapsed amounted to 82,182, of whom 5825 were under treatment in the wards, and 76,354 were supplied as out-patients with advice, medicine, or dressings, to meet their individual requirements. When compared with the corresponding returns for 1871, there is observed to be a marked increase in both departments, which in the former amounted to 279 and in the latter to 3295 over those of 1871. In the course of the latter year the wards recently added to the Hospital were only partially occupied with patients, but during the year 1872 these have been continuously employed, either for the ordinary daily admissions or as reserve accommodation while other wards were vacated for cleansing and repair. The effect of the new additions has been to augment the number of annual admissions to more than 600 over the average of former years, and to raise the daily average number of resident patients to 556, which is fully 50 above the mean of previous years. The proportional increase has been rather

greater in the surgical department than in the medical, from the fact of the individual residence being more protracted in the latter wards, while in the surgical wards it has been slightly below the average of previous years. The mean residence of the two classes respectively has been 36 and 40 days, so that the average stay over all the patients has amounted to a period of 37·73 days, which is but a fraction above the corresponding term of previous years. The most striking fact in connection with the tables of disease is the low rate of mortality which has prevailed during the year, being a little under 9 per cent. of the cases, estimated on the numbers who have been discharged or who have died, and whose cases have consequently been treated to a termination as far as the Hospital is concerned. This reduced death-rate is more remarkable, as during the four years preceding that under consideration there was a progressive annual increase in the deaths in proportion to the numbers treated, until it appeared to reach its maximum in 1871, when it rose to 11 per cent., being the highest point reached since the year 1854, when an epidemic of cholera seriously affected the ordinary Hospital mortality. The diminished death-rate of the past year is apparent in the four main divisions into which the first table, or general statement of the results of treatment, is arranged, but it is also conspicuous in the succeeding tables of disease, especially in those affections most fatal to life, when compared with the corresponding entries of previous years.

In the extensive table comprising endemic and contagious diseases there is no evidence of the existence of any disease occurring in an epidemic form during the year. The few cases of smallpox entered were transferred to the Smallpox Hospital at Stockwell as soon as the disease was apparent, and the usual precautions were taken to provide against the facile admission of patients suffering from diseases having a tendency to destroy life or retard recovery by communication with others. Notwithstanding this, it was found necessary to admit a somewhat larger number than usual of patients suffering from wounds which had acquired a condition which rendered their contiguity to others peculiarly hazardous, and which enforced the necessity for their isolation. The accommodation for this class of patients was supplemented during the year by a

room for females, for whom no adequate provision had previously been found; while the ward for male cases has been in constant requisition, and has been found invaluable. Into this ward 75 cases, mostly suffering from traumatic erysipelas, have been received during the year, 54 of which were admitted straight from their respective homes, while the remaining 21 patients were transferred from the wards in which they had contracted the disease. Of the former class 5 died, and of the latter 2 terminated fatally, death in one case being attributable to internal disease of a malignant character, and in the other to extensive sloughing, associated, no doubt, with the complication referred to, but which originated in this special instance at a period when the ward was remarkably free from any appearance of infection. The tendency in wounds to take on inflammatory or erysipelatous action was peculiarly noticeable during the latter part of the year, when the meteorological conditions were particularly favorable for its development. It has been frequently noticed on former occasions that warm weather, associated with much moisture in the atmosphere, especially during the winter and spring months, has a peculiar influence in the spread of erysipelatous disease, and the last season proves no exception to the rule.

The number of accidents received during the year is considerably higher than the average of former years. The total number admitted amounted to 938, of which 66, or 7 per cent., proved fatal. The table presents the largest entry of accidents since the year 1865, when they rose from a somewhat unaccountable reason to 1051, or to fully 100 above the ordinary average, the deaths in the same year numbering 109. The deaths from accident during the past year have been unusually small in relation to the number admitted, being 25 less than the average proportion when spread over a period of ten years, antecedent to 1872. It is but right to notice the apparent discrepancy betwixt the table of accidents and that comprising injuries of a general and local character, which considerably outnumber the entries in the accident list. This is accounted for by the fact of nearly 10 per cent. of the cases entered in the detailed list of injuries having met with the casualty some days, weeks, or even longer periods prior to their being received into the Hospital, into which they were taken in the

usual way with ordinary chronic cases. In consequence of the less severe character of the injuries, the number of amputations performed on account of accident has been unusually small, and deaths arising from pyæmia or blood poisoning after surgical operations are reported as having occurred in 3 cases only. This disease, so fatal to life, has been entered in the records 18 times during the year, either as a separate malady or as supervening on injuries or disease. At least 7 of the cases so reported were taken into the hospital suffering from the affection, 3 of which were attributable to puerperal causes, while the great bulk of the cases were associated with disease of, or injury to, the bony structures of the body. Among the former 1 case recovered, and 2 of the latter cases also terminated favorably.

In the out-patients' department there is a slight reduction in the number of persons supplied with cards to enable them to continue their attendance for the limited period of two months, during which time they are seen weekly by members of the staff, while in the various supplementary departments, where the work is mainly performed by the resident pupils and senior students, the increase of patients during the year has been very considerable. In the Maternity Charity alone the number of women confined at their own abodes by students of the Hospital has amounted during the year to 2518, or nearly 300 in excess of the corresponding return for 1871, which was noticed at the time to have exceeded in the number relieved any previous year of the history of the charity. As the records of the department are carefully kept by the gentlemen periodically appointed to assist and superintend the students in their attendance on the patients, they form a valuable standard for comparison with other data obtained from kindred sources. The most gratifying testimony to the success of the charity is afforded by the small mortality among the mothers which the records exhibit, the average number of deaths being limited to about 3 in 1000 cases. During the past year 7 deaths are reported to have occurred, being about 1 in every 360 cases; whereas the average mortality from childbed complications throughout the country are usually reckoned at about 1 in every 200 women confined.

STATISTICS OF PATIENTS TREATED IN GUY'S HOSPITAL IN THE YEAR 1872.

I.—*General Statement of the Number of In-door Patients received into the Hospital during the year, with Results of Treatment.*

Remaining 1st January, 1872		537
Admitted during the year		5291
Total		5828
Discharged well or convalescent	1741	
Relieved	2634	
Unrelieved	451	
Died	471	
Remaining 1st January, 1873	531	
		5828

MEDICAL WARDS.

Remaining 1st January, 1872		212
Admitted during the year		2095
Total		2307
Discharged	1776	
Died	308	
Remaining 1st January, 1873	223	
		2307

SURGICAL WARDS.

Remaining 1st January, 1872		325
Admitted during the year		3196
Total		3521
Discharged	3050	
Died	163	
Remaining 1st January, 1873	308	
		3521

Average number resident, daily, throughout the year . 556 { Males, 310; Females, 246 }

Mean residence of each patient, in days, 37·73.

Rate of mortality over all the cases, 8·89 per cent. { Males, 9·7 per cent.; Females, 7·7 per cent. }

MEDICAL CASES.

Average number in Hospital, 234 { M. 114; F. 120 }

Mean residence . . 40·11 days.

Rate of mortality, 14·77 per cent. { M. 17·4; F. 12·1 }

SURGICAL CASES.

Average number in Hospital, 322 { M. 196; F. 126 }

Mean residence . . 36·22 days.

Rate of mortality, 5 per cent. { M. 5·8; F. 3·7 }

II.—*Table of Monthly Admissions, Dismissions, and Deaths, distinguishing the Sexes.*

1872.	MEDICAL PATIENTS.						SURGICAL PATIENTS.					
	Admitted.		Discharged.		Died.		Admitted.		Discharged.		Died.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
January	96	92	75	77	14	10	187	104	168	100	16	6
February	80	87	53	83	15	13	147	104	146	96	7	2
March	80	70	68	63	17	11	155	95	146	98	9	6
April	78	79	67	74	22	11	159	97	155	86	9	5
May	103	98	83	67	10	5	159	96	153	102	9	3
June	94	88	74	89	17	9	183	114	176	118	6	5
July	89	100	71	77	12	10	209	105	182	90	8	2
August	88	99	81	90	11	10	149	86	149	93	8	3
September	65	86	48	81	23	11	156	100	154	85	7	3
October	99	103	84	84	13	13	188	103	170	105	10	1
November	88	90	74	79	9	16	166	98	163	93	13	5
December	73	70	67	67	16	10	167	69	142	80	17	3
Total	1033	1062	845	931	179	129	2025	1171	1904	1146	119	44

III.—*General Summary of the Tables of Diseases.*

DISEASES.	Total.	Cured.		Relieved.		Un-relieved.		Died.	
	M. & F.	M.	F.	M.	F.	M.	F.	M.	F.
1. General diseases	1115	159	144	296	333	56	21	64	42
2. Diseases of nervous system	308	36	62	78	66	28	16	15	7
3. „ eye, ear, and nose	476	72	59	126	143	39	37	...	...
4. „ heart and blood-vessels	229	12	8	60	56	18	9	42	24
5. „ respiratory organs	228	56	29	71	25	7	2	26	12
6. „ digestive organs	450	89	71	103	74	20	27	39	27
7. „ urinary organs	342	49	8	183	20	30	11	28	13
8. „ female organs of generation	308	...	80	...	156	...	44	...	28
9. „ organs of locomotion	432	32	38	190	106	33	16	12	5
10. „ skin and cellular tissue	367	77	70	104	84	13	8	10	1
11. Miscellaneous returns	46	5	15	8	10	4	4	...	...
12. Poisons and general injuries	93	31	20	13	11	1	...	10	7
13. Local injuries	903	408	111	239	79	3	4	52	7
Total	5297	1026	715	1471	1163	252	199	298	173

IV.—Tables of Diseases, with Results of Treatment.

1.—*General Diseases, including Epidemic, Endemic, Contagious, and Constitutional Distempers.*

	Cured.		Relieved.		Unrelieved.		Died.		Registered Fatal Complications, &c.
	M.	F.	M.	F.	M.	F.	M.	F.	
Smallpox	...	...	...		2	...	...	...	Sent to Smallpox Hospital.
Scarlet fever	2	...	...	...	...	...	...	1	Pyæmia.
Typhus fever	1	...	...	...	...	...	...	...	
Enteric fever	14	9	...	...	...	...	4	1	Perforation 2.
Relapsing fever	1	...	...	...	...	...	...	...	
Febricula	1	6	...	...	...	...	...	...	
Ague	5	1	2	...	1	...	...	...	
Measles	...	...	...	...	1	...	...	...	(Removed home.)
Erysipelas	19	8	12	2	...	...	3	1	Tracheotomy 2, pneumonia.
Diphtheria	...	1	...	...	...	...	1	3	
Phlegmasia dolens	...	...	...	1	...	...	...	...	
Pyæmia (simple)	...	...	...	...	...	...	1	2	
„ (puerperal)	...	1	...	...	...	...	...	1	
Gangrene	...	...	1	...	...	...	...	2	Bedsores, Bright's disease.
Tetanus	1	...	...	1	...	...	1	...	Pneumonia.
Acute rheumatism	65	56	7	14	...	...	5	2	Pericarditis 4, Bright's disease 2, pharyngitis.
Gonorrhœal rheumatism	2	...	1	...	1	...	...	...	
Lumbago	2	...	3	1	...	...	...	...	
Wry neck	...	...	...	2	1	...	...	...	
Chronic rheumatism	10	6	17	7	4	...	...	...	
Gout	2	3	2	...	...	...	2	...	Granular kidneys 2.
Rheumatic gout	2	...	4	...	...	1	...	...	(Smallpox.)
Syphilis	21	21	145	233	14	8	...	...	
Cancerous growths	...	1	3	...	2	1	1	1	
Colloid growths—									
Sebaceous	1	3	3	1	...	...	...	...	
Fatty	...	5	1	...	1	...	...	...	
Warty	1	...	1	...	...	...	...	...	
Cystic	...	2	...	1	...	1	...	...	
Fibroplastic	1	4	1	3	1	2	...	...	
Fibrous	...	1	...	...	...	...	...	...	
Vascular	1	...	1	...	...	...	...	...	
Not specified	...	1	1	1	3	...	...	...	
Lupus	1	...	5	5	1	1	...	...	
Elephantiasis	...	...	1	...	...	...	...	...	
Scrofula (general)	1	...	1	...	...	...	...	...	(Scrofulous affections placed with the parts affected.)
Phthisis	3	2	65	48	19	7	44	28	
Rickets	...	...	2	3	...	...	...	...	
Diabetes	1	...	16	4	4	...	2	...	
Purpura	1	1	...	1	1	...	...	...	
Anæmia	...	1	...	2	...	...	...	...	
Chlorosis	...	11	...	1	...	...	...	...	
General dropsy	...	...	1	...	...	...	...	...	
Anasarca	...	...	...	2	...	...	...	...	
Total	159	144	296	333	56	21	64	42	

2.—*Diseases of the Nervous System.*

	Cured.		Relieved.		Unrelieved.		Died.		Registered Fatal Complications, &c.
	M.	F.	M.	F.	M.	F.	M.	F.	
Softening of brain	...	...	2	...	...	...	2	...	
Apoplexy	...	...	...	...	...	...	3	4	Chloroform poisoning, old injury.
Cerebral disease	1	...	6	1	4	...	3	...	Phthisis, diseased bones of ear.
Hydrocephalus	...	...	1	...	1	...	2	...	Softening.
Atrophy of brain	...	...	...	...	...	...	1	...	
Tumour of brain	...	...	...	...	...	...	2	...	Gangrene of lung.
Tumour of Cerebellum	...	...	...	...	...	...	...	1	
Diseased spinal chord and membranes	3	...	3	3	1	1	1	1	Tumour spinal.
Paralysis	1	...	7	3	4	3	...	...	
Hemiplegia (general)	6	3	9	6	1	1	...	...	
„ (partial)	1	...	1	...	...	...	...	...	
Paraplegia	1	...	3	7	2	2	1	1	
„ (partial)	1	...	1	2	1	...	...	...	
Locomotor ataxy	...	...	9	3	2	...	...	...	
Infantile paralysis	...	...	...	...	...	1	...	...	
Local paralysis	1	...	1	...	...	...	...	...	
Facial paralysis	...	1	2	2	...	...	...	...	
Aphasia	...	...	...	2	...	1	...	...	Carotid aneurism.
Lead paralysis	2	2	6	1	1	...	...	...	
Epilepsy	7	5	13	5	3	...	...	...	
Convulsions	...	...	...	1	...	...	...	...	
Spasm muscular	1	...	1	...	...	...	...	..	
Shaking palsy	...	...	2	1	2	...	...	...	
Chorea	3	14	2	7	1	...	...	...	
Hysteria	...	30	...	13	...	4	...	...	
Neuralgia	...	3	1	1	1	...	...	...	
Sciatica	3	...	2	2	1	...	...	...	
Pleurodynia	2	...	1	2	...	...	...	...	
Mastodynia	...	...	...	1	...	...	...	...	
Hypochondriasis	2	...	1	...	1	1	...	...	
Mania	...	1	...	...	2	2	...	...	
Vertigo and headache	1	2	2	3	...	...	...	...	
Pains, &c.	...	1	2	...	...	...	...	...	
Total	36	62	78	66	28	16	15	7	

3.—*Diseases of the Eye, Ear, and Nose.*

	Cured.		Relieved.		Unrelieved.		Under treatment.		Registered Fatal Complications, &c.
	M.	F.	M.	F.	M.	F.	M.	F.	
Ophthalmitis	...	1	...	3	3	2	...	...	
Granular ophthalmia	4	1	6	6	...	...	...	1	
Keratitis	1	...	6	7	1	...	...	3	
Abscess of cornea	...	2	1	...	1	...	2	...	
Ulcer of cornea	...	...	...	1	...	1	...	...	
Opacity of cornea	1	...	1	3	7	1	2	2	
Conical cornea	1	2	...	2	...	...	...	...	
Staphyloma	...	1	1	3	...	1	...	...	
Corneo-iritis	1	2	8	10	1	2	...	2	
Iritis	2	1	2	...	...	2	3	...	
Closed pupil	2	3	15	13	4	2	3	3	
Choroiditis	...	...	2	2	1	...	...	1	
Amaurosis	...	...	1	...	2	...	...	...	
Hæmorrhage into retina	...	...	...	2	1	...	...	...	
Diseased optic nerve	...	...	2	...	3	1	...	1	
Displaced retina	...	...	...	...	2	1	...	...	
Cataract	43	30	16	17	1	7	13	11	
Cataract traumatic	1	...	3	...	...	...	...	...	
Pannus	1	4	4	11	...	...	2	2	
White optic disc	...	1	3	4	5	7	4	1	
Glaucoma	1	3	9	16	3	3	2	3	
Injury to eye	3	1	4	2	...	...	...	...	
Foreign body in eye	...	1	...	...	...	...	...	...	
Suppuration of eye	2	...	...	...	...	...	...	...	
Spasm of eye	...	...	...	...	...	1	...	...	
Eversion of eye	...	...	...	1	...	1	...	...	
Ectropium	...	...	1	2	...	1	...	1	
Entropium	...	...	...	...	1	...	...	...	
Trichiasis	1	...	...	...	...	1	...	...	
Strabismus	...	2	1	...	...	...	...	...	
Blind eye, excision of	...	1	...	...	...	...	...	...	
Inflammation of lachrymal sac	...	...	...	3	1	...	1	...	
Intolerance of light	1	1	1	...	...	1	...	1	
Other affections of eye	...	...	2	1	...	...	...	...	
Ear—									
Deafness	...	...	1	...	1	...	...	...	
Hæmorrhage	...	1	3	1	...	...	...	...	
Abscess of ear	1	...	...	...	...	...	...	...	
Nose—									
Epistaxis	5	1	1	...	...	...	...	...	
Ozæna	...	...	...	1	...	...	...	...	
Polypus	1	...	...	...	1	2	...	...	
Total	72	59	94	111	39	37	32	32	

4.—*Diseases of the Circulatory System, Absorbents, and Glands.*

	Cured.		Relieved.		Unrelieved.		Died.		Registered Fatal Complications, &c.
	M.	F.	M.	F.	M.	F.	M.	F.	
Pericarditis . .	...	...	...	...	...	...	2	2	Pleurisy 2.
Cardiac disease and dropsy . . .	...	...	33	29	5	5	11	13	
Cardiac dilatation .	...	...	...	...	...	...	1	1	
Valvular disease . .	...	...	1	4	1	...	2	...	Pulmonicapoplexy.
Endocarditis . .	...	...	...	...	...	...	2	1	
Palpitation . . .	1	...	1	...	...	...	...	...	
Angina pectoris . .	...	...	1	...	...	...	...	...	
Aortic obstruction .	...	...	2	...	1	...	2	...	
Aortic disease . .	...	...	...	...	...	...	12	5	Pneumonia, pulmonic apoplexy.
Aortic aneurism . .	3	...	4	1	3	3	5	...	
Subclavian aneurism .	...	...	...	2	...	...	...	...	
Innominate . .	...	...	1	...	...	...	2	...	Apoplexy.
Carotid . . .	...	...	...	...	...	...	...	1	Diseased brain.
Axillary . . .	1	...	...	...	...	...	...	...	
Popliteal . . .	4	...	2	...	...	...	1	...	
Femoral . . .	1	...	...	...	...	...	...	...	
Radial . . .	1	...	1	...	...	...	...	...	
Phlebitis . . .	...	...	2	1	...	...	...	...	
Varicose veins . .	...	...	2	1	...	...	...	...	
Nævus vascularis .	...	3	...	6	4	...	...	...	
Cancer of portal vein .	...	...	...	...	...	...	...	1	Extension of cancer.
Embolism . . .	...	...	1	...	...	...	...	...	
Syncope . . .	...	...	...	1	...	...	...	...	
Obstruction to vena cava . . .	...	...	1	...	...	...	...	...	
Obstruction to femoral vein . . .	...	1	...	...	...	...	...	...	
Inflamed glands . .	1	3	1	3	...	...	...	...	
Suppuration of glands .	...	...	3	2	...	...	...	...	
Hypertrophy of glands	...	1	1	1	...	1	...	...	
Cancer of glands .	...	...	1	...	2	...	2	...	
Goitre . . .	...	...	1	5	2	...	...	...	
Addison's disease .	...	...	1	...	...	...	...	...	
Total . .	12	8	60	56	18	9	42	24	

5.—*Diseases of the Respiratory Organs.*

	Cured.		Relieved.		Unrelieved.		Died.		Registered Fatal Complications, &c.
	M.	F.	M.	F.	M.	F.	M.	F.	
Croup	1	1	...	1	...	...	2	1	
Laryngitis	1	1	3	2	1	...	...	...	
Laryngeal disease	...	...	2	1	...	...	...	...	
Cancer of trachea	...	...	...	...	...	...	1	...	
Bronchitis	10	10	18	6	...	2	2	1	Softening of brain.
Chronic bronchitis	2	4	4	6	...	...	3	2	Obesity, dropsy.
Pneumonia	9	3	4	1	...	...	5	...	Pericarditis 2.
Pneumothorax	...	...	1	...	...	...	1	...	
Hæmoptysis	1	3	7	...	1	...	...	1	
Emphysema	3	...	6	1	...	...	2	2	Malignant disease of viscera 2, dropsy 1.
Pneumonic phthisis	...	...	1	2	...	...	2	1	
Pleurisy	8	...	4	2	...	...	1	2	
Chronic pleurisy	5	1	2	...	...	...	...	1	
Empyema	2	...	3	...	2	...	1	...	
Cancer of lung	...	...	...	1	...	...	1	...	
Hydatid of lung	1	...	...	...	...	...	1	...	
Dyspnœa	...	...	1	1	...	...	...	1	
Aphonia	1	...	...	...	...	...	...	...	
Broncho-pneumonia	1	2	1	1	...	...	...	...	
Pleuro-pneumonia	8	2	3	...	2	...	3	...	
Bronchitis and emphysema	3	2	11	...	1	...	1	...	
Total	56	29	71	25	7	2	26	12	

6.—*Diseases of the Digestive Organs, Mouth, and Throat.*

	Cured.		Relieved.		Unrelieved.		Died.		Registered Fatal Complications, &c.
	M.	F.	M.	F.	M.	F.	M.	F.	
Harelip	3	1	4	3	...	...	...	...	
Cancer of lip	8	1	...	...	...	...	...	...	
Cancer of tongue	...	...	1	2	4	...	...	...	
Epulis	...	2	...	...	1	...	...	...	
Cleft palate	...	...	4	3	...	2	...	...	
Alveolar abscess	...	1	...	1	...	...	...	...	
Cynanche tonsillaris	2	10	...	...	...	...	...	...	
Glossitis	...	1	...	...	...	...	...	...	
Carried forward	13	16	9	9	5	2	...	...	

Diseases of the Digestive Organs, &c.—continued.

	Cured.		Relieved.		Unrelieved.		Died.		Registered Fatal Complications, &c.
	M.	F.	M.	F.	M.	F.	M.	F.	
Brought forward .	13	16	9	9	5	2	...	...	
Stricture of œsophagus	...	...	2	1	...	3	...	...	
Cancer of „	...	...	...	...	...	...	2	...	
Diseased pharynx .	1	...	1	...	...	...	...	...	
Ulcer of stomach .	...	...	1	3	...	...	1	1	Granular kidneys.
Cancer of stomach .	...	...	1	...	3	2	5	1	
Diseases of stomach, various . . .	...	...	5	2	1	...	...	...	
Hematemesis . .	3	5	...	1	...	...	...	...	
Gastritis . . .	...	1	2	...	...	...	...	...	
Dyspepsia . . .	4	9	7	4	1	...	...	...	
Gastrodynia . .	2	1	...	1	...	...	...	...	
Vomiting . . .	5	2	2	1	...	1	...	...	
Dysentery . . .	5	1	5	...	...	...	...	...	
Hernia . . .	18	12	12	3	1	...	7	8	Pneumonia, erysipelas, sloughing bowel 4.
Intussusception . .	...	...	...	...	...	...	1	...	
Intestinal obstruction .	...	1	...	2	...	1	...	...	(Foreign body.)
„ fistula . .	...	...	...	2	...	1	...	...	
„ typhlitis .	1	1	...	...	...	...	...	...	
„ diarrhœa .	1	3	1	...	...	...	...	...	
Cancer of intestine .	...	...	...	...	1	...	...	2	
Colic	2	2	...	...	...	...	...	...	
Lead colic . . .	7	1	1	...	...	...	...	...	
Constipation . .	1	4	...	...	...	...	...	...	
Enteritis . . .	1	...	1	...	...	...	...	1	
Anal fistula . .	4	...	16	7	3	...	...	...	
„ fissure . .	...	...	1	...	...	...	...	...	
Hæmorrhoids . .	8	1	10	4	...	1	...	...	
Ulcer of rectum . .	...	...	...	2	1	...	...	...	
Stricture of rectum .	...	...	1	11	...	5	...	2	Colotomy.
Prolapsus of rectum .	...	1	1	...	...	...	...	...	
Cancer of rectum .	...	...	2	...	1	3	2	1	
Congestion of liver .	...	...	1	2	...	...	...	...	
Cirrhosis of liver .	...	...	4	2	...	...	3	3	Pleurisy 2.
Hydatid of liver . .	1	1	2	...	1	...	1	1	
Cancer of liver . .	...	...	...	2	...	...	3	1	
Abscess of liver . .	...	...	2	...	...	...	2	1	Embolism.
Jaundice . . .	7	3	4	3	1	2	3	...	
Gall stones . . .	...	...	...	2	...	...	...	1	
Diseased spleen . .	...	...	2	2	1	1	...	...	
Peritonitis . . .	4	4	2	...	...	1	2	3	Perforation of bowel, diphtheria.
Ascites . . .	...	2	3	1	...	...	4	...	
Abdominal tumours .	1	...	2	6	...	4	...	...	
Lardaceous disease .	...	...	...	...	...	...	3	1	Cancer of viscera.
Vermes . . .	...	...	...	1	...	...	...	...	
Total . .	89	71	103	74	20	27	39	27	

7.—*Diseases of the Urinary Organs.*

	Cured.		Relieved.		Unrelieved.		Died.		Registered Fatal Complications, &c.
	M.	F.	M.	F.	M.	F.	M.	F.	
Bright's disease	4	3	27	12	12	3	10	12	
Pyelitis	1	...	1	...	1	1	1	...	
Renal calculus	...	...	4	...	...	...	...	...	
Renal disease	...	...	2	1	...	...	2	...	Morb. cordis.
Hæmaturia renalis	2	1	2	1	1	...	...	1	
Nephralgia	...	1	1	...	...	...	...	...	
Movable kidney	...	...	...	...	...	1	...	...	
Cystitis	1	...	5	2	1	...	...	...	
Calculus vesical	11	1	6	...	4	...	4	...	Nephritis 3.
Malformed urinary organs	...	...	1	...	1	2	...	...	
Irritable bladder	1	...	2	...	2	1	...	...	
Diseased bladder	...	...	...	...	...	...	1	...	Cancer.
Cancer of bladder	...	...	1	...	...	...	...	...	
Incontinence of urine	1	1	1	3	1	3	...	...	
Retention of urine	...	...	1	1	...	...	...	...	
Diseased prostate	...	...	5	...	1	...	2	...	Cystitis, pyæmia.
Stricture of urethra	10	1	88	...	3	...	7	...	Pyæmia, septicæmia 3, visceral disease 1.
Urethral calculus	...	...	1	...	...	...	...	...	
Urinary abscess	1	...	1	...	...	...	...	...	
Urinary fistula	...	...	3	...	2	...	1	...	
Spermatorrhœa	...	...	1	...	...	...	...	...	
Phymosis	11	...	...	...	...	...	...	...	
Sloughing scrotum and penis	1	...	2	...	...	...	...	...	
Cancer of scrotum and penis	1	...	6	...	...	...	...	...	
Hydrocele	1	...	10	...	...	...	...	...	
Varicocele	...	...	4	...	1	...	...	...	
Orchitis	3	...	8	...	...	...	...	...	
	49	8	183	20	30	11	28	13	

8.—*Diseases of the Female Organs of Generation and Breast.*

	Cured.		Relieved.		Unrelieved.		Died.		Registered Fatal Complications, &c.
	M.	F.	M.	F.	M.	F.	M.	F.	
Encysted ovarian dropsy	...	2	...	4	...	1	...	1	
Diseased ovaries	...	5	...	16	...	3	...	8	
Cancer of ovaries	...	...	...	...	...	...	...	1	
Pelvic cellulitis	...	3	...	14	...	2	...	...	
Leucorrhœa	...	1	...	5	...	1	...	...	
Ulcer of cervix uterus	...	...	...	3	...	...	...	...	
Hypertrophy of uterus	...	...	...	...	...	2	...	...	
„ cervix	...	1	...	1	...	...	...	...	
Irritable uterus	...	...	...	1	...	...	...	...	
Uterine polypus	...	8	...	1	...	...	...	...	
Anteversion	...	1	...	1	...	...	...	...	
Retroversion	...	4	...	12	...	1	...	...	
Prolapsus	...	...	...	1	...	...	...	...	
Vesico-vaginal fistula	...	...	...	2	...	2	...	1	Peritonitis.
Recto-vaginal fistula	...	...	...	1	...	1	...	...	
Atresia vaginæ	...	...	...	1	...	...	...	...	
Cancer of vagina	...	1	...	1	...	2	...	...	
Cancer of labium	...	...	...	2	...	...	...	...	
Vascular tumour	...	2	...	...	...	...	...	...	
Vaginitis	...	2	...	1	...	...	...	...	
Hypertrophy of vulva	...	1	...	1	...	1	...	...	
Climacteric disease	...	...	...	2	...	1	...	...	
Amenorrhœa	...	3	...	7	...	3	...	...	
Vicarious menstruation	...	2	...	4	...	...	...	...	
Dysmenorrhœa	...	2	...	4	...	...	...	...	
Menorrhagia	...	2	...	6	...	...	...	...	
Uterine hæmorrhage	...	1	...	...	...	...	...	...	
Pregnancy	...	4	...	1	...	3	...	...	
Abortion	...	5	...	1	...	...	...	...	
Induction, premature labour	...	4	...	...	...	...	...	...	
Retained placenta	...	1	...	...	...	...	...	...	
Metritis	...	...	...	5	...	...	...	1	Pyæmia.
Cancer of womb	...	...	...	20	...	8	...	6	
Uterine tumours, various	...	...	...	6	...	...	...	...	
Fibroid disease	...	...	...	15	...	1	...	1	Thrombosis.
Fibro-cystic tumour	...	...	...	...	...	...	...	1	
Suppuration of broad ligament	...	...	...	...	...	...	...	1	
Breast—									
Abscess	...	7	...	4	...	...	...	...	
Cancer	...	9	...	6	...	10	...	5	Pleurisy 2.
Glandular tumours	...	6	...	1	...	1	...	...	
Encysted tumours	...	1	...	3	...	...	...	...	
Other tumours	...	2	...	2	...	1	...	2	Pleurisy, erysipelas.
Irritable breast	...	...	...	1	...	...	...	...	
Total	...	80	...	156	...	44	...	28	

9.—*Diseases of the Organs of Locomotion.*

	Cured.		Relieved.		Unrelieved.		Died.		Registered Fatal Complications, &c.
	M.	F.	M.	F.	M.	F.	M.	F.	
Bones—									
Ostitis, os calcis	...	...	1	...	...	...	...	...	
„ humerus	...	...	3	...	...	...	...	...	
„ tibia	...	...	4	5	...	1	...	...	
„ mastoid process	...	...	1	...	...	...	...	...	
„ radius	...	...	2	...	...	...	...	...	
„ ribs	...	2	1	...	...	...	...	...	
„ jaw	...	...	1	1	...	...	...	...	
„ femur	...	...	3	1	...	1	1	...	Suppuration.
Caries of face and jaw	...	...	...	3	1	...	...	...	
„ bones of hand	...	1	1	...	...	...	...	...	
„ bones of foot	3	1	3	6	...	...	...	...	
„ humerus	...	...	...	2	...	...	...	...	
„ tibia	...	...	1	...	...	...	...	1	
„ vertebræ and ribs	...	...	1	1	1	...	1	...	
Necrosis, cranium	...	...	...	1	1	...	...	...	
„ face and jaw	...	...	3	1	...	...	...	...	
„ hand	2	1	...	1	1	...	...	...	
„ foot	...	...	3	3	...	...	...	...	
„ tibia	1	1	13	1	...	...	...	...	(Erysipelas).
„ arm	1	...	...	2	...	...	...	...	
„ femur	2	...	12	3	...	1	...	...	
„ clavicle	...	...	...	...	1	...	...	...	
Separation of epiphysis	3	1	2	...	3	...	...	...	
Exostosis of femur	2	1	...	...	...	...	...	...	
Ditto of bones of foot	3	1	...	...	...	...	...	...	
Cancer of bone	1	...	2	...	2	...	4	...	Pyæmia 2.
Joints—									
Synovitis	3	1	21	13	...	1	...	1	
Diseased knee	5	6	28	16	5	2	2	...	Pyæmia.
„ hip	1	...	44	22	9	1	1	1	Phthisis 2
„ ankle	...	...	4	1	...	3	...	...	
„ shoulder	...	...	1	...	2	...	3	...	Bronchitis, pyæmia, pneumonia.
„ elbow	...	...	8	4	1	...	...	...	
„ wrist	...	...	2	2	1	1	...	...	
„ other joints	...	...	...	...	...	...	...	...	
Loose cartilage	...	...	2	...	...	...	...	...	
Spine—									
Diseased spine	1	...	6	6	2	...	...	...	
Lateral curvature	...	...	1	...	...	1	...	2	Morb. cordis 2.
Angular deformity	...	...	2	...	...	...	...	...	
Muscles and tendons—									
Muscular atrophy	...	...	3	...	2	2	...	...	
Inflam. of muscle	1	...	...	...	...	...	...	...	
Contracted tendons	...	...	1	2	...	1	...	...	
Clubfoot, varus	...	...	3	1	...	1	...	...	
„ equinus	...	2	3	1	...	...	...	...	
Enlarged bursa patellæ	1	13	3	6	...	...	...	...	
Abscess of „	2	7	1	...	...	...	...	...	
Ganglion	...	...	...	1	1	...	...	...	
Total	32	38	190	106	33	16	12	5	

10.—*Diseases of Cellular Tissue and Skin.*

	Cured.		Relieved.		Unrelieved.		Died.		Registered Fatal Complications, &c.
	M.	F.	M.	F.	M.	F.	M.	F.	
Inflammation of connective tissue . .	6	3	4	5	...	...	...	...	
Abscess of head and neck	4	1	5	4	...	...	...	...	
„ upper extremity	4	3	6	1	...	...	...	...	
„ lower extremity	11	5	17	2	1	1	...	...	
„ chest & abdomen	1	2	4	1	2	1	...	...	
„ back and pelvis	6	3	11	3	3	...	3	...	Spinal disease, pyelitis, erysipelas.
Slough and gangrene .	...	...	1	1	...	...	2	...	
Sinus, various . .	1	...	...	1	...	...	...	...	
Skin—									
Diffuse inflammation	...	2	...	...	...	...	...	...	
Psoriasis and lepra .	1	3	4	4	...	1	...	...	
Pemphigus . .	...	...	1	...	...	...	...	...	
Scabies . . .	3	...	1	...	...	...	...	...	
Eczema . . .	9	8	5	3	2	2	1	...	
Cancer . . .	1	...	2	1	1	...	...	...	
Tinea decalvans .	...	...	...	1	...	...	...	...	
Prurigo . . .	...	1	...	1	...	...	...	...	
Ecthyma . . .	...	1	1	1	...	...	...	...	
Phlegmon . .	...	1	...	...	...	...	...	...	
Porrigo . . .	1	...	1	1	...	...	...	...	
Urticaria . . .	...	2	...	...	...	...	...	...	
Cheloid . . .	1	...	...	...	1	...	...	...	
Ulcer of leg . .	22	29	31	41	1	3	...	1	Exhaustion (erysipelas 3).
Ulcers of other parts	2	4	5	5	...	...	1	...	
Boil . . .	...	...	...	1	...	...	...	...	
Carbuncle . .	1	...	2	1	...	...	3	...	Pyæmia 2, diabetes.
Onychia . . .	...	2	...	...	...	...	...	...	
Senile gangrene .	...	...	1	1	...	...	...	...	
Cicatrices from burns	2	...	1	3	...	...	...	...	
Cicatrices from other causes . . .	...	..	1	2	2	...	...	...	
Superfluous toes . .	1	...	...	...	...	...	...	...	
Total . .	77	70	104	84	13	8	10	1	

11.—*Miscellaneous Returns.*

	Cured.		Relieved.		Unrelieved.		Died.		Registered Fatal Complications, &c.
	M.	F.	M.	F.	M.	F.	M.	F.	
Debility	5	14	3	8	...	...	...	...	
Destitution and want	...	1		...	...	...	...	...	
General want of development	...	...	3	...	...	1	...	...	
Obesity	...	...	...	1	...	1	...	...	
Nothing	...	...	...	1	2	1	...	...	
Unascertained	...	...	2	...	2	1	...	...	
Total	5	15	8	10	4	4	...	...	

12.—*Poisons and General Injuries.*

	Cured.		Relieved.		Unrelieved.		Died.		Registered Fatal Complications, &c.
	M.	F.	M.	F.	M.	F.	M.	F.	
Mineral Poisons—									
Chloroform	1	...	...	...	...	...	...	...	
Sugar of lead	...	1	...	...	...	...	...	...	
Nitric acid	1	...	...	...	...	...	...	...	
Hydrochloric acid	...	...	...	...	...	...	1	...	
White precipitate	...	...	...	...	...	...	...	1	
Sulphuric acid	1	...	...	...	...	...	...	...	
Vegetable Poisons—									
Spirits of hartshorn	1	...	...	...	...	...	...	...	
Syrup of poppies	...	...	...	1	...	...	...	...	
Atropine	...	1	...	...	...	...	...	...	
Opium	1	1	...	...	...	...	...	...	
Alcoholism, acute and chronic	5	2	...	...	...	...	1	...	
Foul air	1	...	1	...	...	...	...	...	
Poisoned wounds	1	1	1	...	...	...	...	...	
Sunstroke	1	...	...	...	...	...	...	...	
General Injuries—									
Burns and scalds	12	7	6	5	1	...	7	5	
„ from acids	...	...	...	1	...	...	...	1	
Multiple injury	...	...	...	...	...	...	1	...	
Asphyxia, drowning	3	2	2	1	...	...	...	...	
General contusions	3	5	3	3	...	...	...	...	
Total	31	20	13	11	1	...	10	7	

13.—*Local Injuries.*

	Cured.		Relieved.		Unrelieved.		Died.		Registered Fatal Complications, &c.
	M.	F.	M.	F.	M.	F.	M.	F.	
Head and face—									
Contusions of head and face	9	2	6	2	...	...	...	...	
Wounds of face	11	2	7	2	...	...	1	...	
Scalp wounds	32	5	23	12	...	...	1	...	
Concussion of brain	40	1	10	1	...	...	...	...	
Fracture of skull	2	...	3	1	...	...	8	...	
Fractured base of skull	2	...	...	...	...	...	3	...	
Fracture of jaw	2	...	1	1	...	...	...	...	
Neck—									
Contusions	4	1	1	1	...	...	...	...	
Sprains	1	...	...	...	...	...	...	...	
Cut-throat	...	...	1	...	...	...	1	2	Pyæmia 2.
Chest—									
Contusions	6	2	5	...	...	...	1	...	Emphysema.
Fracture of ribs	10	2	4	...	1	...	2	...	Pneumothorax, pneumonia.
Ditto, with injured lung	2	...	...	...	...	...	1	...	
Fracture of sternum	...	...	1	...	...	...	...	...	
„ clavicle	4	...	5	1	...	...	...	...	
Back—									
Contusion	10	3	9	3	...	...	...	...	
Wound	1	...	1	...	...	...	1	...	Emphysema.
Sprain	2	...	1	...	...	...	...	...	
Fracture of spine	...	...	1	...	...	...	7	...	Pyæmia.
Concussion of spine	3	...	2	1	...	...	...	...	
Injury to spinal cord	...	1	4	1	...	...	...	...	
Abdomen—									
Contusion	7	2	9	1	...	...	...	...	
Wounds	2	...	1	...	...	...	1	...	Peritonitis.
Needles in abdomen	...	1	...	...	...	...	...	...	
Pelvis—									
Contusions	3	1	2	...	...	...	...	...	
Wounds of perineum	1	3	2	...	...	...	...	...	
Ruptured perineum	...	3	...	1	...	4	...	...	(Pyæmia.)
Fractured bones of pelvis	...	...	...	...	...	...	6	...	Pyæmia 1, gangrene 1, ruptured viscera 2.
Upper extremity—									
Contusions	2	2	2	...	...	...	...	...	
Wounds	12	4	23	4	...	...	2	...	Tetanus 1 (erysipelas 3).
Foreign body in hand	1	...	...	...	...	...	...	...	
Injury to shoulder	1	...	...	2	...	...	...	...	
„ elbow	2	...	3	...	...	...	...	...	
„ wrist	1	2	...	2	...	...	...	...	
Carried forward	173	37	127	36	1	4	35	2	

Local Injuries—continued.

	Cured.		Relieved.		Unrelieved.		Died.		Registered Fatal Complications, &c.
	M.	F.	M.	F.	M.	F.	M.	F.	
Brought forward .	173	37	127	36	1	4	35	2	
Fractured humerus .	2	...	9	1	...	...	...	...	
„ forearm .	2	1	1	1	...	...	...	...	
Co. fracture of forearm	1	...	4	...	...	...	...	...	
Ditto of bones of hand	9	2	3	...	...	...	1	...	Pyæmia.
Co. dislocation, thumb	1	...	1	...	...	...	...	...	
Dislocation of clavicle	...	...	...	1	...	...	...	...	
„ shoulder	...	2	4	2	...	...	...	...	
„ ulna	...	...	...	...	1	...	...	...	
„ foot	1	...	2	...	...	...	...	...	
Lower extremity—									
Contusions . .	8	4	12	2	...	...	...	...	
Wounds . . .	14	3	10	1	...	...	1	...	Exhaustion.
Injury to knee . .	3	3	1	5	...	...	...	...	
„ hip . .	14	2	9	1	...	...	3	1	Cellulitis and tetanus.
„ ankle .	4	4	18	9	...	...	...	...	
Fracture of femur .	49	12	5	2	...	...	2	1	
Co. fracture of femur	2	...	...	...	...	...	1	...	
Fracture of neck of thigh . . .	4	2	...	3	1	...	1	1	
Fracture of patella .	5	4	11	4	...	...	...	...	
Fracture of tibia and fibula . . .	72	23	8	7	...	...	3	2	Gangrene, cellulitis, pneumonia, pyæmia.
Co. fracture of tibia and fibula . .	15	4	3	2	...	...	4	..	Gangrene 3, pyæmia 1.
Fracture of fibula .	26	8	5	...	...	...	...	...	
Fracture of bones of foot . . .	1	...	1	1	...	...	...	...	
Co. fracture of bones of foot . . .	1	...	...	...	...	...	1	...	Septicæmia.
Bite from horse, &c.	...	...	1	1	...	...	...	...	
Ununited fracture—									
Tibia . . .	...	...	3	...	...	...	...	...	
Femur . . .	1	...	...	...	...	...	...	...	
Humerus . .	...	...	1	...	...	...	...	...	
Total . .	408	111	239	79	3	4	52	7	

Miscellaneous Operations.

	Cured.		Unrelieved.		Dead.		FATAL COMPLICATIONS.	REMARKS.
	M.	F.	M.	F.	M.	F.		
Excision of Diseased Parts—								
Mammary tumours, cancerous	...	12	...	1	...	3	Pleurisy 2	
" " adenocele	...	7	...	...	...	1	Erysipelas	
" " encysted	...	3	...	...	...	...	... ...	
Cancerous lip	8	1	...	...	...	...	... ...	
" tongue	1	2	2	...	...	...	... ...	
" of other parts	3	1	...	...	1	...	... ...	Jaw, parotid, back, chest, abdomen.
" prolapsed anus	1	...	...	...	1	...	Pneumothorax	
Non-malignant tumours—								
Fibroid	2	...	3	...	...	...	... ...	Jaw 2, foot, palate, cheek.
Fatty	5	...	...	...	...	...	... ...	Jaw, shoulder, back.
Encysted	...	4	...	...	...	...	... ...	Thigh 2, knee, neck.
Follicular	...	2	...	...	...	...	... ...	
Bursal	1	2	...	...	...	...	... ...	Patella.
Excision of joints—								
Knee-joint	1	...	...	...	...	...	... ...	Diseased joint.
Hip-joint, head of femur	3	...	...	...	...	...	... ...	Ditto.
Wrist-joint	1	...	...	...	...	...	... ...	"
Excision of Diseased Bones—								
Tibia	8	...	...	...	...	1	Cirrhosis of liver ...	Necrosis and caries.
Ankle	2	1	...	...	...	...	... ...	" "
Femur	4	2	...	...	...	...	... ...	" "
Bones of foot	5	3	...	...	...	...	... ...	" "
" hand	2	...	...	...	...	...	... ...	" "
" radius and ulna	...	2	...	...	...	...	... ...	" "
" jaw	2	1	...	...	...	...	... ...	Osteo-sarcoma.
Cranial bones	1	...	...	...	...	...	... ...	Compound fracture.
Pelvic bones	1	...	...	...	...	...	... ...	Caries.

Exostosis	4	2	...	...	...	...	... ...	Hand, ankle, scapula, femur, toe.
Excision of penis	2	...	...	...	...	...	... ...	Cancer.
" testicle	3	...	1	...	...	...	... ...	Cancer, struma, cyst.
" stump of thigh	2	...	...	...	...	...	... ...	Epithelioma, neuroma.
" nævus	4	5	...	...	...	...	... ...	Jaw, hip, shoulder, face, back.
Ligature of Arteries—								
Femoral	2	...	...	...	1	...	... ...	Aneurism.
Carotid	...	...	...	...	...	1	... ...	
Reparatory Operations—								
Gastrotomy	...	...	...	...	1	...	Stricture of œsophagus ...	
Nephrotomy	...	...	...	...	...	1	... ...	
Colotomy	2	...	...	...	4	2	... ...	Cancer of viscera 3, cancer of rectum 4.
Ovariotomy	...	7	...	...	...	4	... ...	
Lithotomy	11	...	...	...	4	...	Septicæmia, cancer, pyelitis	Vesical calculus, foreign body.
Lithotrity	3	...	...	...	1	...	Suppurating nephritis ...	
Tracheotomy	1	1	...	...	1	2	Tumour in throat, laryngitis	
Puncture of bladder	3	...	...	...	1	...	Pyæmia	Stricture.
Perineal section	9	...	...	...	1	...	Cirrhosis	Perineal fistula.
Dilatation of urethra	...	1	...	...	...	...	... ...	Calculus.
Operation for cleft palate	2	1	3	2	...	1	Croup	
" harelip	7	4	...	...	...	...	... ...	
Cicatrices from burns	4	1	...	...	...	...	... ...	Arm, neck 3, chin 1.
" other causes	1	2	...	...	...	...	... ...	
Tenotomy	3	2	...	...	...	...	... ...	Club-foot.
Trephining	...	...	1	...	1	...	... ...	Epilepsy, necrosis.
Operations for Hernia—								
Umbilical, exploratory	...	1	...	...	...	...	... ...	
" herniotomy	...	...	...	...	1	...	... ...	Sac not opened.
Inguinal, taxis	8	...	...	...	1	...	Gangrene of bowel ...	
" herniotomy	1	...	...	...	...	...	... ...	Sac not opened.
" "	2	...	...	...	4	...	... ...	Sac opened.
Femoral, taxis	2	1	...	...	...	1	Old age	
" herniotomy	...	7	...	...	...	6	... ...	Sac opened.
" "	...	3	...	...	...	...	... ...	Sac not opened.
Total	127	81	10	3	23	23		

Operation List.—Table of Amputations of Limbs, only.

AMPUTATIONS.	Total.	Ages of cured.	Ages of deaths.	Cured.		Died.		FATAL COMPLICATIONS.
	M. & F.			M.	F.	M.	F.	
Primary, for Injury—								
Shoulder-joint	1	42	...	1	...	...	...	......
Humerus	2	29	11	1	...	1	...	Internal injuries.
Through knee-joint	1	...	53	...	...	1	...	Pyæmia.
Leg	5	23, 52	46, 64, 71	2	...	3	...	Cellulitis, septicæmia.
Secondary, for Injury—								
Humerus	1	17	...	1	...	...	...	......
Through knee-joint	1	...	21	...	...	1	...	Gangrene.
Leg	3	38	27, 58	1	...	2	...	Pyæmia 1, slough 1.
Thigh	2	...	60, 32	...	...	2	...	Gangrene.
Secondary, for Disease—								
Humerus	1	41	...	1	...	...	...	......
Through elbow	1	...	5	1	...	...	...	Gangrene.
Fore-arm	2	17, 36	...	1	1	...	...	......
Through wrist-joint	1	68	...	1	...	...	...	......
Thigh	17	...	...	11	4	2	...	Pyæmia, exhaustion.
Through knee-joint	2	50	32	1	...	1	...	Diarrhœa.
Leg	2	6	57	...	1	...	1	Hæmorrhage.
Total	42			22	6	13	1	

Operations on the Eyes, compiled from the Registers by Mr. R. C. Chicken, Ophthalmic Dresser.

OPERATIONS.	IN-PATIENTS.								OUT-PATIENTS.			Total operations.
	Eye.			Result.					Eye.			
	Right.	Left.	Both.	Successful.	Improved.	Unsuccessful.	Under treat.	Not stated.	Right.	Left.	Both.	
Eyelids—												
Operation for ectropion	1	...	...	...	...	...	1	...	...	1	...	2
" entropion	1	1	2	...	5	...	1	...	1	...	1	9
" nævus	...	...	...	...	...	...	...	...	...	1	1	3
Enlargement of palpebral aperture	2	2	...	4	...	...	...	...	1	...	1	7
Closure of palpebral aperture	...	1	1	2	...	1	...	...	1	1	...	5
Operation for ptosis	...	...	...	...	...	...	...	...	1	...	...	1
" congenital fissure	...	...	...	...	...	...	...	...	...	...	...	...
Conjunctiva—												
Operation for burn	1	...	...	...	1	...	...	...	1	...	...	2
" pinquecula	...	...	...	...	...	...	...	...	1	...	...	1
Syndectomy	...	1	...	...	...	...	1	...	...	...	...	1
Operation for pterygium	...	1	...	1	...	...	...	...	...	1	...	2
Lachrymal apparatus—												
Opening lachrymal sac	...	...	...	...	...	...	...	...	...	...	1	1
Destruction of lachrymal sac	1	1	...	...	1	1	...	...	3	4	1	11
External muscles of eyeball—												
Operation for convergent strabismus	...	1	...	...	1	...	...	...	7	10	26	70
" divergent strabismus	1	2	...	3	...	...	...	...	2	1	1	8
Cornea—												
Removal of opacities by scraping	...	...	...	...	...	...	...	...	2	2	...	4
" " tinting	...	...	...	...	...	...	...	...	6	8	2	18
Operation for conical cornea	2	...	1	1	3	...	...	...	...	...	...	4
" extreme myopia	...	1	...	...	...	1	...	...	...	...	...	1

Operations on the Eyes—continued.

OPERATIONS.	IN-PATIENTS.								OUT-PATIENTS.			Total operations.
	EYE.			RESULT.					EYE.			
	Right.	Left.	Both.	Successful.	Improved.	Unsuccessful.	Under treat.	Not stated.	Right.	Left.	Both.	
Sclerotic—												
Sclerotic incision for glaucoma	5	1	6	3	15	...	...	...	5	3	2	30
Iris—												
Iridectomy for artificial pnpil	4	12	32	8	53	6	13	...	35	26	26	193
„ glaucoma	5	2	10	12	16	3	2	...	4	1	16	64
Removal of entire iris	2	4	3	4	3	1	4	...	8	8	...	28
Crystalline lens—												
Removal of crystalline lens for glaucoma	...	1	...	...	...	...	...	1	...	...	...	1
Extraction of cataract, iridectomy	35	39	55	82	36	2	14	50	...	...	...	184
„ „ common extraction	8	8	6	18	9	1	...	...	...	...	...	28
„ „ Dr. Taylor's method	1	1	...	...	2	...	...	...	...	...	...	2
„ „ suction	...	1	...	...	1	...	...	...	...	...	...	1
„ „ needle operation	...	1	4	...	4	...	...	5	...	...	...	9
Removal of opaque capsule	1	3	...	1	1	...	2	...	...	...	...	4
Eyeball—												
Operation for staphyloma	...	...	...	...	...	...	...	...	2	3	...	5
Abscision	1	1	...	1	1	...	...	...	...	...	...	2
Excision	2	3	...	4	...	...	1	...	7	5	...	17
„ of stump	...	...	...	...	...	...	...	...	1	...	...	1
Total	73	88	240	144	155	16	39	56	88	75	156	722
		401								319		

The results of operations on out-patients are not given, as they are unobtainable from the books. Operations on *both* eyes of *one* patient are counted as two operations in the columns of "Result" and "Total." All the minor operations are omitted from this table.

Causes of the various Accidents admitted in 1872, *with the Mortality.*

CAUSES OF THE ACCIDENTS.	Total cases.	Discharged.		Died.		Remaining.	
		M.	F.	M.	F.	M.	F.
Accidents on the river	39	34	...	1	...	4	...
Assaults	51	29	18	3	1	...	...
Attempts at suicide, excluding poison	7	3	1	1	1	...	1
Bites and kicks of animals	12	7	4	1	...	...	...
Burns from clothes taking fire	16	3	2	5	4	...	2
,, from heated fluids	16	5	5	2	1	2	1
,, from explosion of gas	3	2	...	...	...	...	1
,, ,, gunpowder	5	3	1	...	...	1	...
Collisions between opposing forces	15	11	4	...	...	...	...
,, with street vehicles	117	80	20	5	3	5	4
Cuts and blows from sharp instruments	48	34	9	3	...	2	...
Falls down stairs	52	17	30	...	...	1	4
,, from a height	196	142	19	15	...	19	1
,, on the ground	170	110	41	3	1	11	4
,, of heavy weights	81	68	1	6	...	5	1
Foreign bodies in internal passages	8	2	5	1	...	...	...
Gunshot wounds	2	2	...	...	...	...	...
Machinery accidents	45	37	2	1	...	5	...
Poisoning, accidental	8	5	1	1	1	...	...
,, intentional	6	1	4	1	...	...	...
Railway accidents	22	10	4	5	...	3	...
Torsions of the body	19	14	4	...	...	1	...
Total	938	619	175	54	12	59	19

OUT-PATIENT DEPARTMENT, 1872.

The following numbers include such patients as were furnished with cards and prescription papers, to enable them to continue their attendance for a period of eight weeks:—

	Males.	Females.	Total.
Ordinary medical cases	1,419	1,713	3,132
Ordinary surgical cases	1,885	1,928	3,813
Diseases peculiar to women	...	1,719	1,719
Diseases of the eyes	1,638	1,754	3,392
Diseases of the skin	486	548	1,034
Diseases of the ear	611	856	1,467
Total	6,039	8,518	14,557

Besides the above there were prescribed for in the out-patient rooms by the house physicians and senior students—

	Males.	Females.	Total.
Medical patients	3,354	6,954	10,308
Surgical patients	20,274	18,861	39,135
Total	23,628	25,815	49,443

The number of minor accidents and other urgent cases attended to in the surgery, and not admitted to the wards, was 7506—of which 5136 were men and 2370 were women and children.

The dental cases attended to in the surgery were 2330—of which 1080 were males and 1250 were females.

The number of women confined and attended by the students at their respective homes was 2518.

DETAILS OF MIDWIFERY DEPARTMENT.

Number of women confined during the year		2,518
Number of single births, 2491; twin births, 27. Total children		2,545
Living male children	1,285	
Living female children	1,169	
Dead males	53	
Dead females	38	
		2,545

Of the above children 2467 presented naturally at birth, 35 were cases of breech presentation, 7 were face, 16 foot, 14 arm, 2 placenta previa, 2 transverse, and 2 funis.

Among the mothers there were 7 deaths from the following causes:—2 from puerperal hæmorrhage, 1 from syncope, 2 from puerperal peritonitis, 1 from purpura, and 1 cause unascertained.

Version was performed 12 times, the long forceps were used in 13 cases.

Craniotomy was performed in 1 instance, and transfusion was had recourse to in 1 case.

Among the mothers there were in their

1st confinement	319	Brought forward	2429
2nd "	377	11th confinement	36
3rd "	324	12th "	30
4th "	340	13th "	12
5th "	277	14th "	4
6th "	234	15th "	4
7th "	221	16th "	1
8th "	156	17th "	1
9th "	110	21st "	1
10th "	71		
	2429	Total	2518

Retrospective Summary of Patients relieved during the year 1872.

	Males.	Females.	Total.
Patients under treatment in the wards	3,352	2,476	5,828
Out-patients—			
Surgical, ordinary	1,419	1,713	3,132
Medical, ordinary	1,885	1,928	3,813
Diseases of women	...	1,719	1,719
Diseases of the eyes	1,638	1,754	3,392
Diseases of the skin	486	548	1,034
Diseases of the ear	611	856	1,467
Medical casual or slight cases	3,354	6,954	10,308
Surgical casual or slight cases	20,274	18,861	39,135
Minor accident and surgery cases	5,136	2,370	7,506
Tooth extractions	1,080	1,250	2,330
Midwifery patients	...	2,518	2,518
Total	39,235	42,947	82,182

Retrospective Summary of all the Patients Treated in Guy's Hospital since 1863.

	1863.	1864.	1865.	1866.	1867.	1868.	1869.	1870.	1871.	1872.
IN-PATIENTS.										
Under treatment during the year	5,507	5,511	5,715	5,510	5,245	5,297	5,164	5,123	5,549	5,828
Discharged well or convalescent	2,500	2,538	2,622	2,389	2,109	2,237	1,682	1,673	1,832	1,741
Relieved	1,539	1,504	1,633	1,515	1,532	1,551	2,047	2,057	2,203	2,634
Unrelieved	367	419	400	390	483	411	470	396	422	451
Discharged for special reasons	89	61	71	189	146	116	...	...	...	...
Died	486	480	488	534	509	466	496	498	555	471
Rate of mortality per cent.	9·75	9·58	9·35	10·64	10·65	9·72	10·56	10·76	11·07	8·89
Average number daily resident	505	497	501	496	502	498	487	486	529	556
Mean residence of each in days	33·47	32·92	31·99	32·85	34·93	34·31	34·42	36·92	37·58	37·73
Number of accident cases admitted	866	875	1,051	907	911	805	788	821	892	938
Number of deaths from accident	100	109	102	97	101	83	76	91	85	66
Number of ordinary operations registered	314	301	337	342	362	417	314	345	316	309
Number of deaths after operations	62	66	65	60	69	70	51	63	76	60
Number of ophthalmic operations	501	492	656	606	638	624	499	441	678	722
OUT-PATIENTS.										
Surgical cases	3,403	3,851	3,749	3,807	4,125	3,905	3,655	3,350	3,883	3,132
Medical cases	3,905	3,731	2,987	3,129	3,438	3,456	3,380	3,330	3,216	3,813
Diseases of the eyes	2,348	2,477	2,312	2,461	2,914	3,614	3,775	3,580	3,657	3,392
Diseases peculiar to women	1,753	1,762	1,635	1,703	1,736	1,675	1,708	1,827	1,740	1,719
Diseases of the skin	232	493	847	684	801	1,048	1,047	1,055	1,089	1,034
Diseases of the ear	394	767	826	731	757	960	913	929	1,262	1,467
Casual or minor medical cases	10,140	10,347	9,747	10,045	10,414	10,679	11,152	11,086	10,416	10,308
Casual or minor surgical cases	39,380	38,375	33,446	32,827	37,985	41,159	38.820	38,134	37,797	39,135
Tooth extractions	4,544	5,299	4,789	5,141	4,748	3,655	1,976	2,589	1,955	2,330
Minor accidents	3,838	6,109	6,500	6,030	6,444	6,390	7,319	8,585	5,804	7,506
Women confined at their own homes	1,576	1,608	1,568	1,585	1,727	1,783	1,929	2,183	2,240	2,518

LIST

OF

GENTLEMEN EDUCATED AT GUY'S HOSPITAL,

WHO HAVE PASSED THE

EXAMINATIONS OF THE SEVERAL UNIVERSITIES, COLLEGES,

&c., &c.,

IN THE YEAR 1872.

University of Cambridge.

Final Examination for the degree of Bachelor of Medicine.

A. L. Galabin, M.A. | C. E. Oldman, B.A.
F. C. Turner, M.A.

Second Examination for the degree of Bachelor of Medicine.

R. H. Hughes, B.A. | A. Sangster, B.A.

University of London.

Examination for the degree of Doctor of Medicine.

W. F. R. Burgess. | A. W. Smith.

Final Examination for the degree of Bachelor of Medicine.

B. N. Dalton.

Obtained Scholarship and Gold Medal in Medicine, Second Class Honours in Obstetric Medicine, and Second Class Honours in Forensic Medicine.

M. Harris.

Obtained Gold Medal in Forensic Medicine, and Second Class Honours in Obstetric Medicine.

T. Jones.

Obtained Second Class Honours in Medicine, and the number of marks qualifying for the Gold Medal in Obstetric Medicine.

C. E. S. Perkins.

Obtained Second Class Honours in Medicine.

A. M. Branfoot.

Obtained the number of marks qualifying for the Gold Medal in Obstetric Medicine.

Alfred Ashby.
R. Harris.
E. G. Russell.
W. Williams.

First Examination for the degree of Bachelor of Medicine.

H. Hetley.
T. S. Morley.
F. J. M. Palmer.
S. H. Vines.

Excluding Physiology.

G. H. Keyworth.
J. A. Rigby.

Preliminary Scientific M.B. Examination.

R. E. Carrington.
Exhibition in Chemistry, Exhibition in Zoology, and Second Class Honours in Botany.

A. de W. Baker.
H. Duke.
J. C. Ferrier.
A. Finch.
A. Gray.
W. A. Kidd.
W. A. Simmonds.

University of Aberdeen.

Examination for the degree of M.B.

J. Rigby-Hughes.
With highest Honours.

Examination for the degree of M.C.

J. Rigby-Hughes.
With highest Honours.

Her Majesty's Service.

W. A. D. Fasken.
B. B. Connolly, B.A.
F. E. Barrow.
H. J. W. Barrow.
W. P. Bridges.

Indian Medical Service.

E. G. Russell.
W. A. D. Fasken.
A. M. Branfoot, M.B.
G. C. Hall.
J. Duke.
E. Bovill.
G. A. Dundas.
N. A. R. Harrison.

Royal College of Physicians, London.

Examination for the Licentiateship.

J. N. Kiddle.
C. S. Ticehurst.
J. P. Allwood.
E. J. Domville.
A. K. Newman.
G. Turner.
W. E. Hacon.
J. L'O. Brown.
W. C. S. Clapham.
N. B. Elliot.
M. Lubbock.
R. Wood.
R. J. Pye-Smith.
N. A. R. Harrison.

Royal College of Surgeons of England.

Final Examination for the Fellowship.

F. Durham, M.B.
A. B. Elliott.
T. Kilner Clarke, M.B.

First Examination for the Fellowship.

H. Morris, M.B.
A. Dodson.
S. H. Vines.
H. Ashby.
H. Hetley.
Geo. Snell.
W. Stericker.
H. K. McKay.
F. J. M. Palmer.
F. T. Paul.
A. A. Thomas.
W. H. A. Jacobson, B.A.

Final Examination for the Membership.

January.

A. Buchanan.
J. E. Edwards.
W. A. Marsh.
H. G. Cartwright.
D. Murdoch.
W. Rendall.
G. D. Deeping.
H. M. Langdale.
B. Rix.
H. Cawley.
A. K. Newman.
E. G. Russell.
R. Dunstan.
G. J. Llewellyn.
J. McD. Tudge.
A. Matcham.
C. E. Oldman, B.A.
E. H. Skate.

April.

C.H.Golding-Bird, B.A.
F. H. H. A. Mahomed.
A. W. Emms.
C. S. Ticehurst.
T. W. Jackson.
H. Williams.

May.

R. C. Chicken.
R. H. Hutchings.
G. A. Dundas.
G. Graham.
W. Perkins.
A. L. Galabin, M.A.
C. Knott.
J. Kindon.
T. D. Harries.
E. C. R. Roose.
W. E. Hacon.
H. Williams.
J. McCammon.
R. H. Paterson.

July.

T. Eastes.
F. Lungley.
N. A. R. Harrison.
G. Turner.
R. S. Armstrong.
C. C. Godding.
R. S. Mutch.
S. Elam.
J. L. Morley.
J. W. Scott.
J. Utting.
H. B. Blackburn.
W. C. Hansell.
W. Williams.
T. H. Fagg.
R. Paramore.
G. F. K. Smith.
E. A. Burgess.
R. H. Hughes, B.A.

November.

H. G. Biggs.
D. Duke.
W.H. A.Jacobson, B.A.
T. J. Dixon.
H. S. Branfoot.
E. H. Fenn.
T. G. Lidbetter.
J. J. Bowes.
J. L'O. Brown.
E. Greaves.
V. D. W. Jones.
A. C. James.

First Examination for the Membership.

January.

G. H. Keyworth.
A. N. Taylor.
H. A. Collins.
R. M. Talbot.
C. L. Webb.
E. Bowen.
R. C. Gibb.
G. Wigan.
R. B. Dry.
A. M. French.
J. A. Lewis.
J. T. Carey.
J. Leonard.

April.

R. H. Foster.
H. A. Cookson.
M. Reed.
J. Rendall.
W. H. Harsant.
J. C. Ferrier.
C. E. Barnard.
E. S. Medcalf.
D. C. Morgan.
J. W. Davies.
E. O. Day.
E. O. Reynolds.
W. K. Johnson.
W. E. Dring.
J. McCammon.
H. N. Smith.
A. Sangster, B.A.
C. Duran.
H. Evans.
S. Bingham.
G. W. Bond.
T. S. Morley.
A. H. Jones.
A. Churchward.
L. Davis.
A. Hooper.
J. W. Mason.
A. B. Crowther.
F. E. C. Hood.
G. H. W. Thomas.
C. E. Winckworth.
W. A. Tyson.
O. R. Travers.
T. H. Forty.
R. F. Tomlin.
C. L. Jones.
A. Gray.
J. F. Fry.
W. E. Paley.
O. Edwards.
H. Clarke.
J. Griffiths.
L. Rudd.
L. J. Wilding.
J. M. Hobson.
C. J. Davey.
C. J. C. Mitchell.
E. Whitworth.
D. F. Walker.

May.

J. Clare.
R. J. Morton.
H. F. Eastall.
T. C. Jones.
H. J. Hind.
E. J. Hutchings.
H. N. C. Powell.
J. L. Treherne.
E. T. Crouch.

July.

A. J. Ockendon.
P. O. Jones.
Morgan Lloyd.
J. H. Paley.
G. J. Lewis.
W. M. Jones.
A. Carter.
T. A. McCullagh.
F. W. Saberton.
J. J. Newman.
E. S. Newton.

November.

E. A. H. Herbert.
J. Maudsley.
J. B. Booth.
W. Brown.
A. Carey.
H. Adcock.

Apothecaries' Society.

Silver Medal in Botany.

R. E. Carrington.

Silver Medal in Materia Medica and Pharmaceutical Chemistry.

W. H. Harsant.

Final Examination for the Licentiateship.

December, 1871.

J. E. Edwards.

January, 1872.

J. Clague.

February.

F. H. H. A. Mahomed.
A. P. Kingcombe.
C. S. Ticehurst.

March.

H. G. Cartwright. | C. H. A. Stone. | H. H. Clyma. | J. Utting. | T. Jones.

April.

J. W. Scott. | T. Evans.

May.

R. W. Murphy. | W. E. Bennett.

June.

T. J. Dixon. | T. D. Paradise. | T. Eastes.

July.

B. H. Williams. | A. W. Emms. | N. A. R. Harrison. | W. Wallis.

August.

A. E. Kessen. | F. T. Atkins. | N. B. Elliot. | A. C. James. | R. H. Paterson.

September.

J. S. Whitaker.

October.

W. O. Jennings. | W. H. Coates. | R. M. Talbot. | J. F. S. Smith.

November.

D. Duke. | J. H. Townend. | C. C. Godding.

December.

E. Bevers. | C. F. Bryan. | Thomas Pink.

First Examination for the Licentiateship.

January.

J. Clague. | A. P. Kingcombe. | W. H. Spurgin.

February.

C. B. Dalton. | E. M. Boddy. | E. J. W. Hicks. | W. A. May.

March.

J. Foreman. | J. W. H. Hawton. | J. R. Burton. | T. Pink. | F. J. S. Smith.

April.

W. O. Jennings. | D. Nunez.

May.

A. J. Willcocks.	H. A. Cookson.	R. H. Foster.

July.

S. Bingham.	R. M. Talbot.	J. Rendall.

August.

J. Clare.		C. J. Davey.
G. W. Bond.		W. H. Harsant.
	O. R. Travers.	

September.

H. Evans.	A. Churchward.
C. E. Barnard.	E. S. Medcalf.

October.

H. N. Smith.	E. O. Day.	M. Reid.

November.

F. W. Trevor.	R. F. Tomlin.

GUY'S HOSPITAL MEDALLISTS AND PRIZEMEN, 1871-72.

EXAMINATION OF STUDENTS IN MEDICINE AND ITS ALLIED SCIENCES, AUGUST 8th, 1872.

The Treasurer's Gold Medal for Clinical Medicine.

C. H. Golding-Bird, B.A., London.

The Treasurer's Gold Medal for Clinical Surgery.

C. H. Golding-Bird, B.A., London.

Third Year's Students.

PRIZES.

F. T. Paul, Swaffham, Norfolk, First Prize, £40.
R. C. Chicken, Nottingham, Second Prize, £35.
R. S. Mutch, Charlotte Town, Prince Edward Island, Certificate.
H. Williams, Nottingham, Certificate.
J. P. Bevan, New Cross, Certificate.
A. W. Emms, Ilminster, Somersetshire, Certificate.

Second Year's Students.

H. Clarke, Anerley, First Prize, £35.
C. E. Barnard, Tasmania, Second Prize, £30.
C. Duran, Costa Rica, Third Prize, £20.
W. H. Lamb, Northampton, Certificate.

First Year's Students.

No First Prize awarded.

H. F. Lancaster, Southsea, Hants, Second Prize, £25.
J. Utting, Dereham, Norfolk, Third Prize, £10 10s.

ENTRANCE EXAMINATION IN CLASSICS, MATHEMATICS, ETC.

F. C. Coley, Avenue, Blackheath, First Prize, £25.
E. O. Giblin, Hobart-Town, Tasmania, Second Prize, £20.
A. Finch, Blackheath, Third Prize, £15.
D. Elcum, Cheltenham, Certificate.
G. W. Baird, Gillingham, Kent, Certificate.
W. C. Kidd, Blackheath Park, Certificate.

THE PUPILS' PHYSICAL SOCIETY, 1871-2.

A Prize of £10 was awarded to Mr. T. Eastes for his Essay on "The Pathology, Diagnosis, and Treatment of Diseases of the Larynx."

A Prize of £10 to Mr. Chicken for his Paper, entitled "Notes on Physiology," read before the Society.

A second Prize of £5 to Mr. J. A. Rigby, for his Paper on "The Antiseptic Treatment."

CLINICAL APPOINTMENTS HELD IN THE YEAR 1872.

RESIDENT HOUSE PHYSICIANS.

G. J. Oldham.	M. Harris, M.B.
T. Jones, M.B.	A. K. Newman.

RESIDENT HOUSE SURGEONS.

G. D. Deeping.	F. C. Turner, M.A.	H. E. Southee, M.B.
W. H. Jalland.	A. Gillingham.	F. J. Carey, M.A.

RESIDENT OBSTETRIC ASSISTANTS.

G. D. Deeping.	R. J. Pye-Smith.	W. Beatson.
F. Coomber.	J. Rigby-Hughes, M.B., M.C.	N. Kiddle.
A. R. Dunnage.	H. E. Southee, M.B.	F. C. Turner, M.A.
C. J. Ticehurst.	A. Buchanan.	T. D. Harries.

SURGEON'S DRESSERS.

G. F. K. Smith.	H. S. Branfoot.	W. H. Spurgin.
W. E. Hacon.	J. L. Morley.	A. Buchanan.
N. B. Elliot.	T. R. H. Clunn.	R. M. Langdale.
W. G. Nash.	T. D. Harries.	S. Elam.
H. J. F. Groves.	D. Duke.	H. Ashby.
A. L. Galabin, M.A.	T. D. Ransford.	R. H. Hughes, B.A.
T. Eastes.	M. S. Duke.	W. H. A. Jacobson, B.A.
C.H.Golding-Bird, B.A.	G. E. Power.	
	F. N. Lungley.	

CLINICAL ASSISTANTS.

R. J. Pye-Smith.
F. J. Carey, M.A.
N. A. R. Harrison.
W. H. Spurgin.
C.H.Golding-Bird, B.A.
J. L. Morley.
W. Williams.
E. G. Younger.
N. B. Elliot.
R. S. Armstrong.
H. S. Branfoot.
D. Duke.
E. Bovill.
T. Eastes.
R. H. Hughes, B.A.
W. G. Nash.
G. F. K. Smith.
T. R. H. Clunn.

DRESSERS IN THE EYE WARDS.

A. E. B. Love.
W. E. Hacon.
G. W. Graham.
A. C. James.
W. W. Dickinson.
N. Kiddle.
C. J. W. Pinching.
W. Wallis.
E. A. Burgess.
M. Harris, M.B.
R. Manser.
C. S. Ticehurst.
B. H. Williams.
A. R. Dunnage.
E. W. J. Hicks.
R. C. Chicken.

POST-MORTEM CLERKS.

G. J. Sealy.
R. S. Mutch.
M. S. Duke.
F. F. Bradshaw.
E. Field.
J. W. Hawton.
M. Reid.
D. Nunez.
J. McD.Tudge.
R. Manser.
G. Snell.
T. D. Paradise.
H. Williams.
J. T. Carey.
E. S. Medcalf.
R. F. Tomlin.
V. D. W. Jones.
R. C. Chicken.
E. W. J. Hicks.
F. T. Paul.
A. Hooper.
J. S. Wilkins.
J. Clare.

ASSISTANT-SURGEON'S DRESSERS.

C. C. Godding.
E. W. J. Hicks.
A. P. Kingcombe.
J.W. Hawton.
W. Stericker.
J. T. Carey.
C. B. Elliott.
E. H. Saunders.
J. H. Townend.
C. B. Dalton.
J. S. Wilkins.
M. Reid.
H. F. Eastall.
R. D. Hughes.
F. W. Trevor.
J. A. Lewis.
W. A. May.
H. Harsant.
L. Rudd.
H. N. Smith.
E. S. Medcalf.
H. Ashby.
E. G. Russell.
J. Clague.
T. D. Paradise.
F. G. Sweetland.
J. Foreman.
C. Seymour.
E. A. Bevers.
R. M. Talbot.
J. C. Irving.
E. Field.
R. F. Tomlin.
T. Evans.
C. L. Webb.
A. M. French.
J. S. Whitaker.
A. Hooper.
R. H. Foster.
E. T. Crouch.
J. Griffiths.
H. P. Taylor.
H. Williams.
Ebenezer Cullen.
J. Utting.
J. A. Rigby.
A. Wilcocks.
F. Atkins.
W. O. Jennings.
A. N. Taylor.
W. J. Gard.
T. D. Ransford.
D. B. Lees, B.A.
J. P. Bevan.
G. E. Keer.
J. Clare.
F. Smith.
J. W. Davies.
W. J. Tyson.
L. Davies.
H. Clarke.
E. H. Keyworth.

DRESSERS IN THE SURGERY.

H. J. F. Groves.
W. J. Gard.
E. H. Saunders.
W. A. Simmonds.
F. W. Trevor.
H. H. Clyma.
J. A. Lewis.
W. Y. Davenport.
G. H. Keyworth.
J. T. Carey.
R. W. F. Carter.
W. A. May.
J. Utting.
G. Wigan.
O. R. Travers.
E. O. Day.
L. Davies.
D. C. Morgan.
H. Clarke.
A. J. Wilcocks.
W. E. Dring.
J. W. Mason.
C. Duran.
R. J. Morton.
D. Price.
C. B. Elliott.
E. M. Boddy.
F. J. S. Smith.
D. Nunez.
R. M. Talbot.
E. R. L. Crespin.
C. L. Webb.
G. E. Keer.
R. D. Hughes.
W. Stericker.
A. N. Taylor.
H. B. Blackburn.
J. H. Paley.
H. Smith.
H. Harsant.
H. A. Cookson.
T. C. Jones.
J. F. Fry.
J. Rendall.
F. E. C. Hood.
C. E. Winckworth.
A. B. Crowther.
H. Evans.
J. S. Whitaker.
H. R. McKay.
E. Field.
J. S. Wilkins.
W. O. Jennings.
R. F. Tomlin.
E. Bowen.
A. M. French.
A. Bevan.
D. B. Lees, B.A.
S. J. Wolton.
J. Clare.
H. A. Collins.
E. T. Crouch.
R. H. Foster.
C. E. Barnard.
O. Edwards.
W. J. Tyson.
A. Sangster, B.A.
D. H. Forty.
A. Churchward.
H. J. Hind.
D. T. Evans.
L. J. Wilding.

DENTAL SURGEON'S DRESSERS.

G. W. Graham.
F. J. Smith.
F. G. Sweetland.
W. J. Heddy.
E. Field.
T. C. Jones.
W. W. Dickenson.
E. J. W. Hicks.
B. H. Williams.
A. M. French.
J. R. Burton.
A. W. Taylor.
E. H. Saunders.
W. Wallis.
T. Eastes.
E. A. Bevers.

AURAL SURGEON'S DRESSERS.

G. M. Roberts.
R. W. Murphy.
G. J. Sealey.
E. Tyson.
W. A. Jacobson, B.A.
E. O. Day.
W. A. Simmonds.
R. J. Pye-Smith.
A. Mahomed.
T. D. Ransford.

CLINICAL WARD CLERKS.

W. Roots.
M. S. Duke.
C. F. Bryan.
A. C. James.
A. E. Kessen.
W. E. Bennett.
J. Utting.
C. C. Godding.
T. D. Paradise.
H. Ashby.
C. Jackson.
W. A. Simmonds.
J. S. Wilkins.
A. Buchanan.
E. F. Thomas.
J. W. Scott.
N. B. Elliot.
F. T. Paul.
H. J. F. Groves.
N. J. Heddy.
R. W. Murphy.
C. Knott.
R. S. Mutch.
H. B. Blackburn.
D. Price.
J. Foreman.
W. C. Hansell.
R. H. Hutchings.
F. Lungley.
T. D. Ransford.
H. S. Branfoot.
W. H. A. Jacobson, B.A.
E. Cullen.
J. P. Bevan.
H. K. McKay.
W. A. Garrard.
J. S. Whitaker.
C. Seymour.
W. A. May.

CLINICAL WARD CLERKS (*continued*).

G. Snell.
F. G. Sweetland.
R. C. Chicken.
W. W. Pinching.
George Wigan.
T. C. Jones.
J. B. Booth.
C. E. Barnard.
E. W. J. Hicks.
J. C. Irving.
A. Wilcocks.
C. B. Elliott.
F. J. S. Smith.
D. Nunez.
C. R. L. Crespin.
J. A. Lewis.
R. Manser.
R. M. Talbot.
W. Stericker.
C. B. Dalton.
J. A. Rigby.
J. Clare.
H. Hetley.
E. H. Saunders.

ASSISTANT-PHYSICIAN'S CLERKS.

R. Coom.
W. Y. Davenport.
W. E. Bennett.
H. H. Clyma.
W. H. A. Jacobson, B.A.
F. T. Atkins.
D. Nunez.
E. A. Bevers.
R. C. Gibb.
H. B. Blackburn.
J. H. Keyworth.
M. Lubbock.
H. P. Taylor.
F. G. Sweetland.
W. C. Hansell.
C. C. Godding.
J. Rendall.
W. A. Simmonds.
E. Field.
M. Reid.
R. W. Murphy.
F. F. Bradshaw.
J. A. Rigby.
R. C. Chicken.
J. C. Irving.
J. W. H. Hawton.
A. W. Emms.
J. R. Burton.
A. M. French.
S. Bingham.

SURGICAL WARD CLERKS.

E. R. L. Crespin.
C. B. Dalton.
R. F. Tomlin.
H. F. Eastall.
L. Rudd.
W. E. Dring.
W. de L. Hay.
J. Maudsley.
A. D. Brenchley.
M. Lubbock.
W. H. Lamb.
H. C. Taylor.
H. Cotton.
St. Clair Shadwell.
W. H. Hall.
C. J. Davey.
E. O. Reynolds.
A. B. Crowther.
L. J. Wilding.
W. E. Snook.
A. L. Bowen.
H. Duke.
A. J. Ockenden.
W. C. Morris.
T. C. Barlow.
H. L. Champneys.
H. C. Burton.
G. Wigan.
R. D. Hughes.
O. Edwards.
C. J. C. Mitchell.
L. Davies.
H. S. Lewis.
H. B. Blackburn.
H. A. Collins.
J. R. Burton.
E. Amphlett, B.A.
T. W. R. Romano.
W. H. L. Welchman.
H. C. Strover.
O. Gwatkin.
D. F. Walker.
A. Hooper.
A. Churchward.
J. F. J. Sykes.
W. Cock.
F. J. Elliot.
A. H. Jones.
H. Caddy.
E. O. Giblin.
R. C. Richards.
J. H. Paley.
W. C. James.
J. R. Burton.
C. L. Webb.
M. Lloyd.
R. C. Carrington.
H. A. Cookson.
D. H. Forty.
D. B. Lees, B.A.
H. F. Bartlett.
D. D. Malpas.
C. Rees.
H. H. Harsant.
J. Utting.
W. Mount.
H. Stevens.
W. K. Johnstone.
J. W. Bond.
J. G. Burgess.
J. F. Fry.
J. M. Hobson.
A. Sangster, B.A.
H. M. Powell.
D. T. Evans.
W. H. Mainwaring.
W. H. Walbourne.
A. C. Routh.
W. O. Jennings.
E. R. Kavanagh.

GUY'S HOSPITAL.

THE SESSION OF 1872-73 COMMENCED ON THE 1ST OCTOBER, 1872.

The INTRODUCTORY ADDRESS was given by

P. H. PYE-SMITH, M.D.,

In the Anatomical Theatre, on Tuesday, the First of October, 1872, at Two o'clock, after which the Medals and Prizes for the past Session were distributed by the Treasurer.

MEDICAL AND SURGICAL STAFF.

Consulting Physician.

SIR W. W. GULL, Bart., M.D., D.C.L., F.R.S.

Physicians.

G. OWEN REES, M.D., F.R.S.; S. O. HABERSHON, M.D.; S. WILKS, M.D., F.R.S.; F. W. PAVY, M.D., F.R.S.[1]

Assistant Physicians.

W. MOXON, M.D.; C. HILTON FAGGE, M.D.; P. H. PYE-SMITH, M.D.[1]

Consulting Surgeons.

J. HILTON, ESQ., F.R.S.; E. COCK, ESQ.

Surgeons.

J. BIRKETT, ESQ.; J. COOPER FORSTER, ESQ.; THOMAS BRYANT, ESQ.; ARTHUR DURHAM, ESQ.

Assistant Surgeons.

H. G. HOWSE, M.S.; N. DAVIES-COLLEY, M.C.

Consulting Obstetric Physician.—HENRY OLDHAM, M.D.

Obstetric Physician.—J. BRAXTON HICKS, M.D., F.R.S.

Assistant Obstetric Physician.—J. J. PHILLIPS, M.D.

Ophthalmic Surgeon.—C. BADER, ESQ.

Dental Surgeon.—J. SALTER, ESQ., F.R.S.

Assistant Dental Surgeon.—H. MOON, ESQ.

Aural Surgeon.—JAMES HINTON, ESQ.

Medical Registrar.—FREDERICK TAYLOR, M.D.

Surgical Registrar.—J. F. GOODHART, ESQ.

Apothecary.—JAMES STOCKER, ESQ.

[1] Since the commencement of the Session Dr. Owen Rees has resigned. Dr. Moxon has been appointed Physician; Dr. Frederick Taylor, Assistant Physician.

WINTER COURSES.

LECTURES.

Medicine.—Dr. OWEN REES and Dr. WILKS.
Mondays, Wednesdays, and *Fridays,* at Three.

Clinical Medicine.—Dr. OWEN REES, Dr. HABERSHON, Dr. WILKS and Dr. PAVY.
Saturdays, at Half-past One.

Surgery, including Demonstrations in Practical Surgery.
Mr. BIRKETT and Mr. COOPER FORSTER, assisted by Mr. RENDLE.
Tuesdays and *Thursdays,* at Half-past Three, *Fridays,* at Half-past Ten.

Clinical Surgery.—Mr. BIRKETT, Mr. POLAND, Mr. BRYANT, and Mr. DURHAM.
Wednesdays, at Half-past One.

Anatomy, Descriptive and Surgical.—Mr. DURHAM and Mr. HOWSE.
Tuesdays, Wednesdays, Thursdays, and *Fridays,* at Nine.

Physiology and General Anatomy.—Dr. PAVY.
Mondays, Wednesdays, and *Fridays,* at a Quarter-past Four.

Clinical Lectures on Midwifery and Diseases of Women.—Dr. BRAXTON HICKS.
Wednesdays, at Half-past One.

Chemistry.—Dr. DEBUS and Dr. STEVENSON.
Tuesdays, Thursdays, and *Saturdays,* at Eleven.

Experimental Philosophy.—Mr. G. F. RODWELL.
Wednesdays, ———

DEMONSTRATIONS.

Anatomy.—Mr. DAVIES-COLLEY, *Daily.*

Assistant Demonstrators.—Mr. RENDLE and Mr. LUCAS.

Morbid Anatomy.—Dr. MOXON and Dr. FAGGE, *Daily,* at Half-past Two.

Cutaneous Diseases.—Dr. FAGGE, *Tuesdays,* at Twelve.

Practical Physiology,— Dr. PYE-SMITH.
Mondays, Thursdays, and *Saturdays,* at half-past One.

SUMMER COURSES.

LECTURES.

Materia Medica and Therapeutics—Dr. HABERSHON.
Tuesdays, Thursdays, and *Fridays,* at Three.

Midwifery.—Dr. BRAXTON HICKS.
Tuesdays, Wednesdays, Thursdays, and *Fridays,* at a Quarter to Nine.

Medical Jurisprudence.—Dr. ALFRED TAYLOR.
Tuesdays, Thursdays, and *Saturdays,* at Ten.

Clinical Medicine.—Dr. FAGGE, Dr. PYE-SMITH, and Dr. TAYLOR.
Wednesdays, at Half-past One.

Clinical Surgery.—Mr. HOWSE and Mr. DAVIES-COLLEY.
Fridays, at Half-past One.

Ophthalmic Surgery.—Mr. BADER.
Fridays, at Three.

Diseases of Women.—Dr. PHILLIPS.
Mondays, at Three.

Pathology.—Dr. MOXON, *Saturdays,* at Nine.

Hygiene.—Dr. HILTON FAGGE.
Thursdays and *Saturdays,* at a Quarter past Twelve.

Comparative Anatomy and Zoology.—Dr. PYE-SMITH.
Mondays and *Fridays,* at half-past One.

Mental Diseases.—Dr. DICKSON, *Mondays,* at Ten.

Botany.—Mr. JOHNSON.
Tuesdays, Thursdays, and *Saturdays,* at Half-past Eleven.

Vaccination.—Dr. PHILLIPS.

DEMONSTRATIONS.

Practical Chemistry.—Dr. DEBUS.
Mondays, Wednesdays, and *Fridays,* Ten to One.

Operative Surgery.—Mr. DURHAM.
Mondays and *Thursdays,* at Three.

Practical Courses in Botany, Comparative Anatomy, and Morbid Histology.

The Hospital contains 720 beds. Special Clinical Instruction is given by the Physicians in wards set apart for the most interesting cases.

Clinical Lectures—Medicine, Surgery, and Midwifery—Weekly.

Lying-in Charity—Number of cases attended annually about 2000.

Diseases of Women—26 beds. Ophthalmic Cases—50 beds.

Museum of Anatomy, Pathology, and Comparative Anatomy—Curator, W. Moxon, M.D.,—contains 10,000 specimens, 4000 drawings and diagrams, an unique collection of Anatomical Models, and a series of 400 Models of Skin Diseases. Gentlemen desirous of becoming Students must give satisfactory testimony as to their education and conduct. Fees—£40 for the first year, £40 for the second, £20 for the third, and £10 for the succeeding year of attendance; or 100 guineas in one payment entitles a Student to a perpetual ticket.

Dressers, Clinical Assistants, Clinical Ward Clerks, Obstetric Residents, and Dressers in the Eye Wards, are selected from the Students according to merit. The House-Surgeons and House-Physicians have rooms and commons in the Hospital. Six Scholarships, varying in value from £25 to £40 each, are awarded at the close of each Summer Session for general proficiency. Two Gold Medals are given by the Treasurer—one in Clinical Medicine and one in Clinical Surgery. A Voluntary Examination takes place at Entrance, in Elementary Classics and Mathematics. The first three candidates receive respectively £25, £20, and £15.

Mr. Stocker will give any further information that may be required.

ASTLEY COOPER PRIZE.

The next Triennial Prize of Three Hundred Pounds,

Under the Will of the late Sir Astley P. Cooper, Bart.,

WILL BE AWARDED TO

THE AUTHOR OF THE BEST ESSAY OR TREATISE

ON INJURIES AND DISEASES OF THE SPINAL CORD.

The Condition annexed by the Testator is, "That the Essays or "Treatises to be written for such Prize shall contain original experi- "ments and observations, which shall not have been previously pub- "lished, *and that each Essay or Treatise shall* (as far as the subject "shall admit of) *be illustrated by preparations and by drawings*, which "preparations and drawings shall be added to the Museum of Guy's "Hospital, and shall, together with the Work itself and the sole and "exclusive interest therein and the copyright thereof, become hence- "forth the property of that Institution, and shall be relinquished and "transferred as such by the successful candidate."

And it is expressly declared in the Will "that no Physician, or "Surgeon, or other officer for the time being, of Guy's Hospital or of "St. Thomas's Hospital, in the Borough of Southwark, nor any person "related by blood or by affinity to any such Physician, or Surgeon, "for the time being, or to any other officer for the time being in "either of the said Hospitals, shall at any time receive or be entitled "to claim the Prize." But, with the exception here referred to, this Prize is open for competition to the whole world.

Candidates are informed that their Essays, either written in the English language, or, if in a Foreign Language, accompanied by an English translation, must be sent to Guy's Hospital on or before January 1st, 1874, addressed to the Physicians and Surgeons of Guy's Hospital.

Each Essay or Treatise must be distinguished by a Motto, and be accompanied by a sealed envelope containing the Name and Address of the Writer. None of the envelopes will be opened, except that which accompanies the successful Treatise. The unsuccessful Essays or Treatises, with the illustrative preparations and drawings, will remain at the Museum of Guy's Hospital until claimed by the respective writers or their agents.

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